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CONTENTS Page 1. **INDEX TO ADVERTISEMENTS** Page

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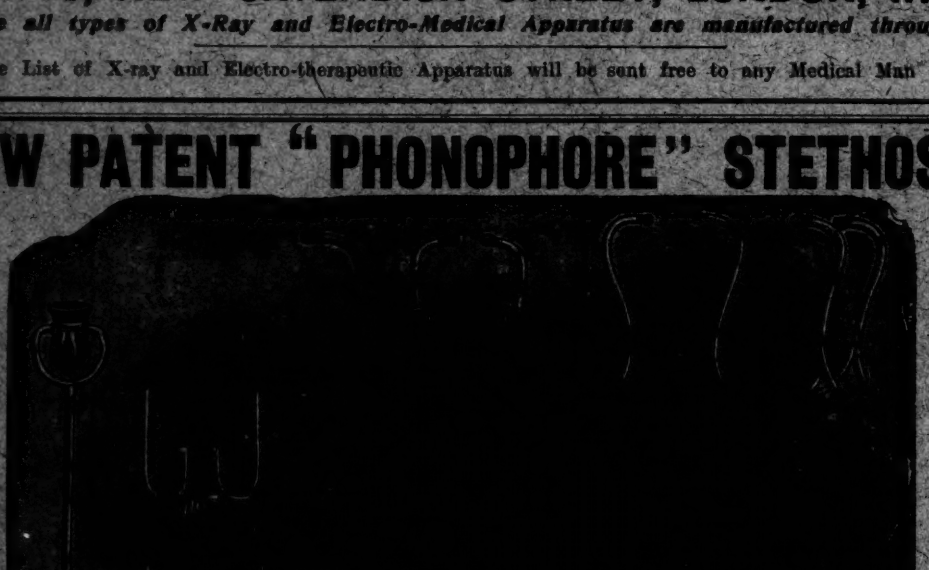

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MEDICINE AND THE SEA AFFAIR.

INTRODUCTION.

BY
Surgeon-General SIR ARTHUR MAY, K.C.B., K.H.P., F.R.C.S., R.N.,
Medical Director-General, R N.

THIS outline of the work of the medical service of the Royal Navy, necessarily brief from the exigencies of space, may well be prefaced with the satisfactory statement that the health of the service afloat has been excellent—better, indeed, than in times of peace. This fortunate result is due to several factors: in the first place, to the efforts of preventive medicine and hygiene, especially the improved ventilation of warships introduced shortly before the outbreak of war, a subject more fully dealt with on pp. 537–539; in the second place, to the healthy isolation of the Grand Fleet, far from the temptations of seaports; thirdly, to the minute precautions taken in drafting men from the shore dépôts to the fleet, which entail due quarantine after exposure to infectious fevers; fourthly, to lectures by the medical officers to the ships' crews dealing with personal hygiene and insisting on the results of alcoholic excess and the dangers of venereal disease; and, further, to the care taken by all officers, by keeping the men physically fit by means of exercise, and by combating in various ways the effects of monotony and relative inactivity, to maintain the high spirit of confidence in eventual success.

At the outbreak of war the medical personnel was at once expanded by the mobilization of the retired, emergency, and Volunteer Reserve medical officers, by the creation of a large number of temporary surgeons for the period of hostilities, and by the appointment of about ten consultants (two being anaesthetists), including Sir Watson Cheyne, President of the Royal College of Surgeons of England, and Sir William Macewen, Regius Professor of Surgery in Glasgow. Rather later an old type of naval medical officer, the surgeon's mate, was revived in the enrolment as surgeon-probationers R.N.V.R. of medical students who had passed the examination in anatomy and physiology, and who had begun, but not completed, their clinical work. They were placed in torpedo-boat destroyers and other small vessels which otherwise do not carry medical officers, so as to render first aid, and, as the records of the Jutland battle show, this trust was fully justified. The sections which follow have been contributed by medical officers responsible for the subjects dealt with.

MEDICINE AND CLINICAL PATHOLOGY.

BY
Fleet Surgeon P. W. BASSETT-SMITH, C.B., F.R.C.S., R.N.,
AND
Temporary Surgeon-General H. D. ROLLESTON, C.B., M.D., F.R.C.P., R.N.,
Senior Physician, St. George's Hospital.

THE general methods of diagnosis and treatment are naturally the same in naval and civil hospitals, and do not, therefore, require any description. The association between clinical and laboratory work is as close as in the metropolitan hospitals with teaching schools attached, and new methods of diagnosis are thus tested and utilized to the full.

The war has thrown much additional work on the naval hospitals and has led to the extensive substitution of temporary surgeons for the regular medical staff owing to the necessity for employing the latter afloat, and during this period the increasing tendency of modern medicine towards subdivision and specialization has been reflected on the navy by the assignment of temporary surgeons with previous experience of special branches of their profession, such as ophthalmology, neurology, tuberculosis, otology and laryngology, and bacteriology, to the care of such patients and duties. Up-to-date departments for *x*-ray work, dentistry, massage, and electrical treatment are attached to the hospitals where the sick-berth staff are trained for the service afloat. The work of the laboratories of the large base hospitals was assisted by the utilization of men with scientific knowledge but without medical qualifications, and the Medical Research Committee sent Dr. P. Fildes to Haslar as a bacteriological expert, and afforded other facilities.

Vaccines.

At the Royal Naval College, Greenwich, there is a teaching school with large laboratories and research rooms attached, which during the war has been the central establishment for the preparation of prophylactic vaccines and the distribution of curative serums to the fleet, the naval service on shore, and especially to the recently established Royal Naval Division and the Royal Naval Air Service. Here, also, most of the examinations of air, water, and food for the service afloat and the various shore dépôts called into being during the last few years have been carried out. During the war more than 2,250 bottles of antisepsis vaccine have been sent from this laboratory to the ships and fighting forces. This in 1914 was supplied by Sir Almroth Wright, but since that time has been manufactured at Greenwich from strains of pyogenic organisms isolated from wounds received in the war. For prophylactic use nearly 6,000 doses of antitetanus serum have been issued, mainly to the Royal Naval Division serving in Gallipoli and in France. During the past two years anticholera vaccine for more than 50,000 men has been supplied to the forces in the Eastern Mediterranean and Persian Gulf, and to the latter a quantity of plague prophylactic was also sent. Since the recognition of dysentery over 2,200 doses of antidysenteric serum have been dispatched for hospital use. At this laboratory and at Malta the greater part of the antityphoid vaccines used in the naval service have been prepared. The laboratories of Chatham, Haslar, Plymouth, and Malta, in which routine examinations of clinical material of all kinds (and also of the milk and food supply, and dressings) are carried on, have had a greatly increased amount of work during the war in the form of systematic examinations, both from a diagnostic and prophylactic point of view, in connexion with infectious diseases.

Antityphoid inoculations of men likely to be exposed to infection have been systematically carried out. In the first year of the war they were inoculated with a typhoid vaccine received from Sir Almroth Wright, over 5,000 bottles, containing 25 c.cm. each, being used. When paratyphoid infections became prevalent, a triple vaccine was prepared at Greenwich and Malta containing the typhoid organism and being multivalent for paratyphoid A and B, from strains isolated from cases in the Eastern Mediterranean. It contained the full dose of the typhoid germ and half the number of paratyphoid A and B. A fair degree of immunity, as judged by the agglutination test, was thus produced. The reaction is not excessive and much time and trouble are saved without sacrificing the antityphoid immunizing power. With this more than 40,000 men have received protective inoculations, and by this means the incidence of typhoid among enteric cases in 1916 was reduced from 35 per cent. in the uninoculated to 11 per cent. in the inoculated,* or 0.7 per cent. of the total forces in the endemic area, and undoubtedly the severity of the disease was considerably lessened among those who did contract the disease.

Dysentery.

The Royal Naval Division in Gallipoli in 1915 suffered, in common with the other forces on land, from diarrhoea, dysentery, enteric and obscure fevers. The numerous convalescents sent to England were filtered through the large naval hospitals to prevent the escape of any dysenteric or enteric carriers into the general population. The diagnosis on arrival was confirmed or modified by the verdict of the laboratory based on bacteriological, serological, and microscopic investigations. The result of these numerous routine examinations incidentally threw light on the duration and course of the agglutination changes due to the influence of inoculation on the one hand and of definite infection with the enteric group of micro-organisms on the other hand, and thus enabled a more accurate diagnosis to be arrived at in any given case; but it was generally recognized that for certainty of diagnosis the culture of the organism from the blood, faeces, or urine was essential. In the dysentery group of infections the percentage of entamoeba infections found was not very high, but amongst those infected there were some very obstinate carriers, resistant to all forms of

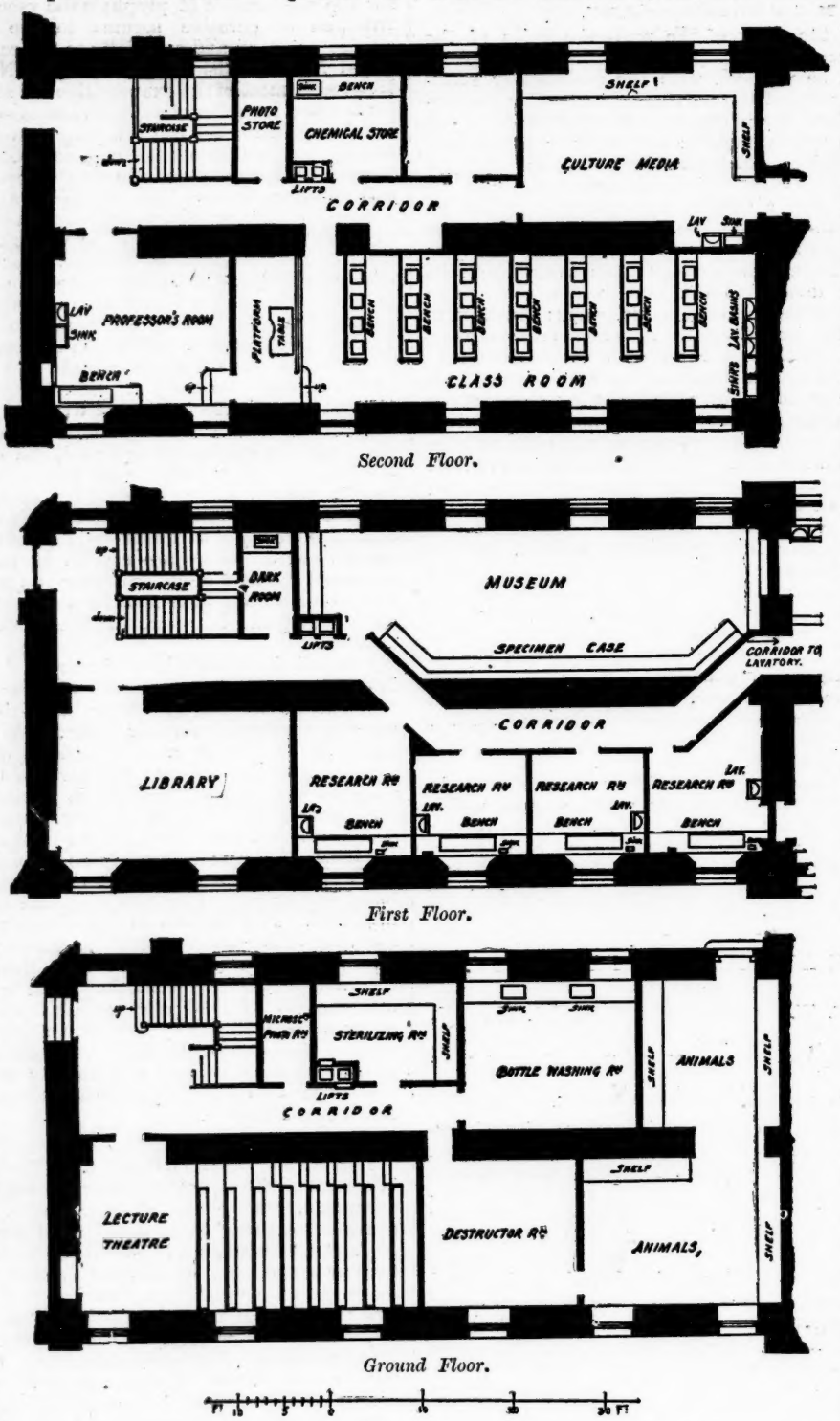
* Vide *Journ. Royal Naval Medical Service*, 1917, iii, 30-32.

emetine. Some vague intestinal symptoms have been traced to such organisms as Morgan I bacillus, and in one instance at least great benefit was derived from vaccine treatment with the organism isolated.

Cerebro-spinal Fever.

In 1915 cerebro-spinal fever became epidemic in England, and during the first year of the war 170 cases of the disease occurred in the navy. Among the various precautions taken to check the spread of this disease, examination of swabs from the naso-pharynx of all new entries was undertaken at the beginning of 1916. At Greenwich alone 5,000 such swabs were examined during the first half of 1916, and of 4,713 cases of healthy non-contacts 46, or 0.976 per cent., were found to be positive, the diagnosis being made on the morphological, cultural, and agglutinative characters. The percentage obtained from contact cases was 5.77. During the winter of 1916–17 up to February, over 4,000 swabs have been examined. From 3,900 non-contact cases there were 112 positive cases, or 2.8 per cent., which is considerably higher than that found in 1915–16. These were all segregated, and thus numerous infective foci were prevented from spreading the disease, which in this district has kept at about the same level as in the preceding year, although more men passed through the dépôt. In 299 instances the organisms isolated were examined by agglutination tests; of these 112 were positive and 187 negative, using the multivalent serum supplied by Flexner as the final criterion. The greater number were again tested by the four univalent strains prepared by Mervyn Gordon; of 82 so examined 36 proved to belong to the type I, 40 to type II, none to type III, and 3 to type IV; 3 did not react to any of Gordon's serums. In the subsequent examination of these carriers 81 per cent. gave no further evidence of infection, partly no doubt as a result of the prophylactic measures employed. During 1916, at the Royal Naval Hospital, Chatham, 7,220 new entries were examined, giving 94, or 0.76 per cent., positive results; among 805 close contacts there were 52 carriers, or 6 per cent., and among 527 remote contacts 6 carriers. At the Royal Naval Hospital, Haslar, among 5,000 new entries examined during January and February, 1917, there were 316, or 6.3 per cent., carriers; whereas among 2,022 new entries examined rather later during 1916—namely, in the spring—there were no positive carriers. This corresponds with the observations at Greenwich, and suggests an "epidemic of carriers." At the Royal Naval Hospital, Plymouth, among 5,220 new entries examined during 1916 there were 117, or 2.2 per cent., carriers, and among 723 contacts 144, or 19.9 per cent., carriers.

By means of this systematic examination of new entries from outside districts the detection and segregation of carriers have been very thorough. During the second year of the war the number of cases of cerebro-spinal fever in the navy declined to 104, although the total strength had greatly increased. This fall in the incidence of the disease, whether entirely correlated with the coincident diminution in the cases of cerebro-spinal fever in the civil and military population, or due to prophylactic measures (quarantine of drafts, examination of contacts and new entries), is eminently satisfactory, especially as out of these 274 cases of cerebro-spinal fever in the navy during



GREENWICH ROYAL NAVAL COLLEGE MEDICAL SCHOOL: PLAN OF QUEEN ANNE BUILDING.

the first two years of the war 22, or 8 per cent. only, occurred in sea-going ships. In the second year of the war the serum treatment, which had proved to be a failure in the previous year, was successful; 2,500 doses were issued from Greenwich, and the mortality fell 17 per cent., to 36 per cent. of all cases. This may be largely ascribed to the use of Flexner's multivalent meningococcic serum generously supplied gratuitously by the Rockefeller Institute, New York, and of Mervyn Gordon's various serums, which were not available during the first year of the war.

A number of cases clinically suggesting cerebro-spinal fever (meningismus) occurred, but no confirmation could be obtained by laboratory methods. The cerebro-spinal fluid was clear, though under increased pressure. No organisms were observed microscopically or by culture, and the blood did not contain any antibodies to any meningococcic strains.

Venereal Disease.

In the treatment of venereal disease, which is more in evidence than in most general civil hospitals, the essential intimate association of clinical and laboratory work is well organized. The diagnosis of syphilis by the microscopical detection of the spirochaete in the initial lesion, by the Wassermann reaction of the blood in the later stages, and by the cytological examination and the Wassermann reaction of the cerebro-spinal fluid in luetic lesions of the central nervous system is an established routine in the larger hospitals and laboratories, and the treatment by intravenous injection of arsenical compounds is universally controlled by the examination of the urine for arsenic. During 1916 the total number of Wassermann tests made was 16,766; at Haslar alone during that year 1,833 injections of arsenical compounds were given for syphilis; kharsivan was given on 1,522 occasions, galyl 55, and novo-arseno-billon 256 times.

Protozoal Infections.

As a result of the large number of men serving in tropical and subtropical regions protozoal infections have been frequent. These areas of active operations may be divided into three—(1) the Eastern Mediterranean and Mesopotamia, (2) East Africa, and (3) West Africa.

1. In the Mediterranean area malarial fevers have been most abundant around Salonica where low-lying swampy ground has been chiefly occupied; the disease has been very severe, and mostly of the malignant form caused by the *P. falciparum*, and the clinical aspect has not infrequently suggested enteric, dysentery, or sunstroke. As the infection is unfortunately very resistant to quinine, the most important prophylactic measures are the destruction of mosquitos by drainage and other methods. The largest number of cases in the navy occurred among the Royal Naval Air Service who live on shore. In the Gallipoli area malaria was not common, but short fevers of the dengue or sand-fly type, often described as "Mediterranean dengue," were very frequent. The knowledge that sand-flies are so often the infective agent has enlarged the scope of preventive measures, and a great reduction of these fevers may be expected in the future. Incidentally it is noteworthy that the prophylactic measures strictly enforced against undulant fever have practically eliminated this disease, which ten years ago would have filled the Mediterranean hospitals. This result emphasizes the value of the work done by a well-organized scientific Commission and of the practical application of its recommendations. The occurrence of many cases of beri-beri in the forces in this area proves the importance of an extended study of the food question and other factors concerned in such deficiency diseases.

2. In East Africa the necessity of thorough measures in the prophylactic issue of quinine is most important, as the prevailing type of fever is best controlled by this drug, which should be given both before and during the whole period that men are employed in the endemic area.

3. In West Africa, particularly in the Cameroon area, the varieties and frequency of protozoal and filarial diseases have been very noticeable, and prophylactic measures against them are therefore essential. Of malaria, which is very common, two types are constantly present, quartan and subtertian, the double infection being almost always found in the same case, frequently associated with Calabar swellings and filariae in the blood. In this region tsetse flies are abundant and trypanosome infections have occurred in Europeans. Early search for these parasites is, therefore, most necessary, and appropriate treatment should be given as soon as possible. A case now at Greenwich of over eighteen months' duration shows how persistent treatment can control the disease, for there are practically no symptoms, although the parasite is pathogenic to white rats in eighteen days. The occurrence of mixed blood infections should therefore be suspected; benign and malignant malaria with trypanosomes or filariae have been found together, always associated with a high eosinophilia (up to 50 per cent.). The quartan malarial parasite is most difficult to eradicate and is very resistant to arsenic, recurring in the blood of those with trypanosome infections after a year's treatment with intravenous and intramuscular injections of antimony and arsenic.

No case of small-pox has been recorded in the navy during the period of the war, thus proving the value of vaccination, which has been compulsory since about 1858.

SURGERY.

BY

Deputy Surgeon-General W. G. AXFORD, R.N.,

AND

Temporary Surgeon-General G. LENTHAL CHEATLE, C.V.O., C.B., F.R.C.S., R.N.

Surgeon, King's College Hospital.

THE equipment of naval hospitals and their treatment of the wounded are on the same lines as in the best British and Continental institutions. If Haslar be taken as an example, the critical visitor would see that all cases of bacteriological importance are diagnosed and treated in association with a perfectly equipped laboratory, in which discharges are stained, cultures are made from blood and wound discharges, vaccines are prepared, and sections are cut of tissues removed from the body for the purpose of microscopical examination. Hence it is needless to point out further how great is the importance attached to the relation between the laboratory and the treatment of surgical disease in this hospital.

Treatment of Wounds Received in War.

The whole question of aseptic and antiseptic treatment has been revised and judgements passed upon the different methods of accomplishing each branch. On the whole, authorities are not satisfied with the aseptic treatment of these wounds. Although it appears successful in some cases, it fails too often in others to encourage its general use. The hypertonic salt solution has been given complete trial, with the result just stated. Wounds undergoing this treatment are liable to secondary or mixed infections. At one time the wounds in one of the wards at Haslar became secondarily infected with *B. pyocyaneus*; the appearance of this micro-organism was at once detected, and it soon disappeared by substituting the antiseptic for the aseptic method. Secondary infections very rarely occur in efficient antiseptic treatment.

In the early part of the war an investigation was carried out in the laboratories of Greenwich and Chatham Hospitals as to the best methods of treating war wounds with various antiseptics.[1] The real problem was to find a diffusible substance which could be applied at, or as shortly as possible after, the time of infliction, and which would inhibit bacterial growth until thorough disinfection and cleansing could be effected at a field hospital. Of the various substances tested, cresol and salicylic acid produced the best results, and appeared to be the most useful for the purpose required. A cresol paste (20 per cent. in lanolin and wax base) and a powder containing equal parts of boric and salicylic acids ("borsal") were introduced. These had given excellent results in laboratory infections, but met with less success in cases from the front, on account of the difficulties of time and places incident to war conditions. Successful cases have been reported from the Gallipoli campaign in which the treatment was adopted, severe gunshot and shell wounds remaining free from suppuration and healing readily.[2] That a cresol or carbolic acid paste is a valuable treatment for wounds on board ship is shown in a report on various cases so treated in a battleship,[3] and wounds, including compound fractures, treated in Chatham Hospital by carbolic acid cleansing and liberal introduction of cresol paste healed well without suppuration.

At Haslar a "green spray" composed of equal parts of 2 per cent. malachite green dissolved in 80 per cent. rectified spirit and water, and 2 per cent. perchloride of mercury dissolved in 80 per cent. rectified spirit and water, has proved satisfactory. It is advisable to keep the two solutions separate, unless the antiseptic mixture is in constant use. The mixture contains 1 per cent. each of malachite green and mercuric chloride in the form of a compound—$C_{23}H_{25}N_2Cl_4$ (Micklethwait)—each molecule of malachite green combining with two of mercury. The compound is easily dissociated, and when it comes in contact with the tissues probably forms an albuminate of mercury and an albuminate of malachite green. The malachite green is reduced by living tissues to the leuco-compound, and therefore becomes invisible in a wound but still maintains its activity. Sloughs and necrosed tissues do not reduce the stain. The albuminate of mercury remains in the wounds as a dépôt, and is slowly dissolved by the exudates, and then exerts its antiseptic action. The bacteriological work on which the use of this compound is based and satisfactory clinical results were published in 1915.[4] The mixture is non-toxic and can be applied to mucous membrane. It is a trustworthy germicide for sterilizing the skin before operations, and is applied by means of a spray. As it stains the skin green the area so treated is clearly marked out. When applied to septic wounds it practically stops secondary infection and steadily diminishes the number of pre-existing micro-organisms. Its value has also been proved in osteo-myelitis, septic compound fractures, burns, ulcers, boils, and carbuncles.

The treatment of infected war wounds by physiological methods was inaugurated by Colonel Sir Almroth Wright, who introduced the physiological saline solution (0.85 per cent. sodium chloride) and the hypertonic solution containing 5 per cent. of the salt. He argues that the hypertonic solution inhibits and arrests bacterial growth, produces a lymphagogic action, and sets free a tryptic ferment for the digestive cleansing of the wound. Dressings should be applied warm, very wet, and covered with an impermeable tissue. If the position of the wound render it practicable, immersion in a 5 per cent. saline bath is the best procedure. The bath should be intermittent to allow of the alternating lymphagogic and digestive cleansing action. Normal saline dressing is used in the intervals. Extensive lacerated wounds with fracture caused by shell or bomb have more recently been packed with salt tablets wrapped in gauze folds, the whole being covered with jaconet. This dressing, which usually causes pain for some hours, can be left for two or three days provided the outer covering is moist with discharge, showing that lymph flow is active.

The use of hypochlorous acid as an antiseptic has come into prominence during the war, and chiefly in the form of eusol—a solution containing approximately 0,5 per cent. of the acid—has been extensively employed in naval hospitals. It is a powerful germicidal agent as proved by laboratory experiments, is non-toxic to the tissues, and being gaseous penetrates deeply to all parts of the wound. The solution of hypochlorite of sodium, 0.5 to 0.6 per cent., introduced by Dakin and Carrel is also in use together with the special method of injection tubes and light gauze packing to ensure contact of the fluid with the whole surface of the wound. Good results have been obtained from this treatment, the wounds cleaning quickly and a healthy granulating action appears. If employed for a long period both solutions have in a few cases produced oedema and irritation of skin. This can be prevented by vaseline smears.

The clinical results obtained by the use of a bismuth, iodoform, and paraffin paste[5] in septic wounds, including compound fractures, has led to its employment in the naval hospitals with encouraging results. Though a less powerful and less soluble antiseptic agent than the hypochlorites, observation has shown that it maintains a continuous antiseptic action in the wound. It excites a free exudation of serum, and granulation tissue grows freely in contact with it. The wound after thorough cleansing is swabbed with ether or rectified spirit, a little of the paste is rubbed into the tissues, a thin layer being left in the deeper parts, and a gauze dressing applied. The dressing can be left on and the wound undisturbed for seven days or longer. This is an advantage, especially in compound fractures; it saves labour, dressings, and much distress to patients. Drainage tubes are not required, as the paste does not prevent the escape of discharge. The constituents are toxic if freely absorbed; the quantity used, therefore, should not exceed two drachms.

At Haslar successful drainage of wounds has been obtained with a four-way drainage rubber staff, which in transverse section is a cross.[6] It overcomes the accumulation of discharge which occurs in a tube if the opening be not dependent. When using the four-way staff the pressure exerted by the contraction of surrounding tissues is directed upon the discharges, which are forced out. With regard to the dressing applied to septic wounds generally, constant and repeated change is always the practice.

Burns.

Hitherto picric acid as a first dressing has been unrivalled, and septic burns treated by hot saline baths and boric fomentations, followed by a mildly antiseptic ointment of soft consistence, have healed readily and well. Médecin-major Barthe de Sandfort's "ambrine" treatment (vide p. 540) is now under trial.

Equipment.

For the treatment of the after-effects of severe injuries such as stiff joints, atrophied musculature, and nerve lesions, the naval hospitals are fully equipped. Surgical gymnasiums have been established and fitted with medico-mechanical apparatus to aid in the restoration of articular and muscular function. The forms of apparatus were designed to carry out by mechanical means the various movements and manipulations of the Swedish system of physical exercises, and include a combination weight and pulley apparatus—stationary bicycle—apparatus for foot circumduction, knee and foot flexion and extension, elbow pendulum with shoulder extension, frictional wrist machine, finger machine, shoulder circling movements, etc. The machinery can be set at any desired resistance by the aid of graduated levers and adjustable weights. For impaired articular movement radiant heat treatment (solarium bath) is also employed. Electrically the interrupted and continuous current in its various forms is in use, as well as the high frequency current, including diathermy. The system of testing muscle reaction by condenser discharges has been adopted. Ionization is practised extensively in a great number of injuries, and has been found particularly useful in obstinate healing wounds and in relaxing scar tissue. An excellent and complete *x*-ray apparatus is in use, with improved means for the localization of foreign bodies. All of the most recently invented splints are also available. Hey Groves's instruments for inducing and maintaining correct adjustments in fractured bones are in use.

The Wildey hypodermic syringe, designed by Deputy Surgeon-General A. G. Wildey, R.N., has been used with great satisfaction both in naval actions and in the field. The syringe with needle fixed is fitted into a metal sheath with safety-pin attachment by which it can be fastened to the coat and thus be readily available at any moment. The sheath, which can be quickly removed and replaced, protects it from dust and dirt. A spare needle fits neatly into the hollow piston. The syringe is used in conjunction with a solution bottle fitted with rubber cap, through which the needle is passed and the syringe rapidly charged.

The assistance afforded by accurately applied pressure in tourniquet work is shown by a metal tourniquet designed in Haslar.[7] The freedom and simplicity with which its pressure can be increased or diminished with delicacy should encourage a more constant use of the tourniquet without fear of damage to tissues or of oozing of blood after the operations. Its advantages are best displayed during operations upon cases of traumatic aneurysm, aneurysmal varix, and varicose aneurysms. A rubber tourniquet is difficult to apply and remove, and when applied its pressure is greater than required and maintained longer than necessary. These drawbacks are abolished by the use of this new metal tourniquet.

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HYGIENE.

By Fleet Surgeon R. C. MUNDAY, R.N.

JUST as the fighting service of the navy was found, at the outbreak of war, prepared at all points for any emergency, so also the medical service of the navy stood equipped with every weapon that modern sanitary science could suggest. In August, 1914, many eminent combatant naval officers were of opinion that the numerous and far-reaching precautions for safeguarding and fostering the health of the personnel would to a great extent have to be abandoned in the face of the pressing exigencies of modern warfare. It was also generally thought that the war would probably be of short duration, and that many conditions of life which, if long continued, would be detrimental to health, could and indeed must be endured for a few months. The Director-General of the Naval Medical Department, however, has from the outset always maintained that the objects to be kept constantly in view are to keep as many officers and men as possible in the highest state of fighting efficiency, and to reduce the loss of service from sickness to a minimum. It was evident also that the means to this end were constant supervision of the daily life of the personnel and the continuous adoption in practice of measures born of modern research. As a result of this doctrine, the war, instead of producing a reduction or relaxation of the requirements of modern sanitation, brought with it a great speeding up of hygienic vigilance, together with progressive improvement in the appliances and apparatus employed in preventive medicine throughout the naval service, not only afloat but also in our many shore establishments. Combatant officers and local administrators who were at first sceptical of or even strongly opposed to activity in such directions have come to see the military advantages accruing therefrom, and now demand the maintenance of a high standard of hygiene. That success, beyond anything the most optimistic prophet could have foretold, has attended the efforts made by the Naval Medical Service is evident from the extraordinarily small loss of service from sickness in the navy, in the dockyards, and in the Admiralty munition factories; moreover, the well established fighting efficiency of our sailors and aviators points in the same direction.

Ventilation.

The improvements in our warships since hostilities commenced are perhaps more pronounced in the matter of ventilation than in any other branch of hygiene. These improvements are the outcome of recommendations made by a committee appointed by the Admiralty at the end of 1912 to investigate and report on the best methods of ventilating modern warships. The Admiralty were moved to this step by certain observations recorded at a series of conferences of naval and civilian medical men summoned in 1910 to consider and report on the causes and effects of tuberculosis in the navy.

In March, 1913, a First Interim Report was submitted by the Committee to the Admiralty, making certain urgent recommendations of a constructional nature; and as a result of these representations a definite minimum standard—200 cub. ft.—of individual cubic space for sleeping places was laid down, and a uniform minimum fan supply of 3,000 cub. ft. of air per hour per man was arranged for all sleeping and all ordinary working and living spaces. The position of various ventilators on the weather deck was so arranged as to ensure a continuous supply of pure air under all conditions of weather and sea. The undesirable position also of certain alternative intakes between decks was abolished and methods of improvement in this respect were inaugurated. The Committee considered that a powerful exhaust effect from the engine room and stokehold ventilation was available for use on the mess decks when required; but as a general rule they strongly recommended, and the Admiralty adopted, the plenum system combined with natural exhaust for living spaces, and the fan exhaust system with natural supply for spaces in which are generated disagreeable odours, great heat, water vapour, or deleterious gases; but it was specifically stated that no fan supply should be fitted for the ventilation of such places. Silent-running fans, means for avoidance of draughts, arrangements for accessibility of the interior of air trunks for cleaning purposes, and the fine adjustment of, and protection from unauthorized tampering with, air-warming appliances are now fitted in all new ships. Formerly improvement in the ventilation and drainage of bathrooms was urgently needed, and at the suggestion of the Committee special innovations were introduced by which the atmosphere in these places was rendered purer and at the same time prevented from pervading the living spaces. Lastly, the inadequate electric lighting of midshipmen's studies and of departmental offices was corrected, a 3 ft. candle illumination on the desks being so arranged that the light passes over the left shoulder of the person reading or writing; now also offices in which persons are working most of the day are placed where natural light and ventilation are available. Not only did the Admiralty order the recommendations to be embodied in the designs of all new ships, but they also gave instructions that so far as was feasible completed ships should be brought into line with the Committee's pronouncements, and during the war, as the older ships have come into dockyard hands for a refit, their ventilation and sanitation has been brought up to date.

In April, 1913, a Second Interim Report was published, dealing chiefly with administrative matters, and in accordance with the Committee's suggestions a senior medical officer was appointed as an additional member of the staff of the Medical Director-General to assist the Director of Naval Construction in the consideration of all plans and details of fittings in connexion with ventilation and hygiene of ships building, all such plans being referred to the Medical Director-General's department for that purpose before final approval was given. This medical officer was also placed at the disposal of the Director of Naval Equipment in the event of his requiring expert advice on any point of naval hygiene, and the former now inspects the hygienic arrangements, including ventilation, in ships building as they approach completion, so as to avoid as far as possible any necessary alterations when the ships are completed; he also co-operates with the above departments in dealing with proposed alterations and improvements in the ventilation and sanitation of ships already built.

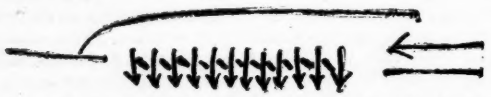
Further, there is on board every ship one commissioned officer responsible to the captain for the general supervision and the best use of the means available for the ventilation of the ship; and whether, in every case, the senior medical officer be actually employed on this duty or not he is at least always in close touch with the officer detailed for it, and is now recognized as the official expert on matters of ventilation and hygiene generally. Moreover, every ship now has a well-organized ventilation party for the management of the ventilation appliances under the orders of the ventilation officer. The medical officers also give lectures on board ship to officers and men on elementary hygiene, with especial reference to ventilation; assistant constructors going through a course at Greenwich College attend the lectures on naval hygiene given at the medical school there, and medical officers under instruction at Greenwich are taught the construction of fans, how to read plans of ventilation, and the considerations governing the volume and velocity of air passing through trunks, ducts, etc.

As affording a good index of the efficiency of the means of ventilation, regular observations of wet and dry bulb temperatures in living and working spaces are made by medical officers afloat, and samples of air are taken in compartments where the ventilation seems unsatisfactory. These samples are sent to Greenwich College for analysis and report in duplicate, one copy being forwarded to the ship and the other to the Medical Department for the information of the Director-General, and to enable him to keep in touch with the requirements of ship ventilation. Every ship also now submits a quarterly report, signed by the captain, showing what means of ventilation and warming have been in use, the extent of the supervision exercised, records of wet and dry bulb temperatures taken in living spaces, and results of analyses of air, together with any recommendations for improvement.

The Final Report of the Ventilation Committee was issued in March, 1914, and contained *inter alia* a proposal for a new system of trunking, devised, after a long series of experiments at Portsmouth Dockyard, to overcome the disadvantages of previous systems by which intolerable draughts were produced and air and warmth were distributed in a most uneven manner throughout the living spaces.

The principle of the new system which has now been adopted in our most recent battleships and cruisers is that by means of an adjusted deflector projecting into the air duct a limited flow of air is directed into a large number of outlet gratings.

It was found that with a suitable but very simple and inexpensive form of grating the air passes out through it with a fairly uniform velocity at all parts. As, however, the area of the grating is considerable in proportion to the air allowed to issue through it, the velocity of the issuing air is low, and no unpleasant draught is perceptible at more than a foot away even when 100 cubic feet of air a minute are issuing from a grating of 18 by 6 inches. The grating is made of expanded steel, and it was found that a three-eighths of an inch mesh placed so that its direction tended to deflect the air at right angles to the trunk thus:



produced the best effect at a minimum of cost and weight. An endeavour was then made by varying the curvature of the deflector to obviate the inequality of distribution over the face of the grating, and experiments were made with deflectors:

(*a*) Concave, thus:

(*b*) Straight, thus:

(*c*) Convex, thus:

The distribution of the air was found to be a function of (1) the velocity of the air in the trunk flowing past the deflector; (2) the amount of opening of the deflector; (3) the shape of the deflector.

On the whole, the straight deflector proved to be the most satisfactory and was adopted in all subsequent experiments; and for gratings in the proximal end of the trunk nearest to the fan, where the velocities are high and the angle of opening of the deflector small, the straightness and truth of the deflector is of great importance.

As each deflector takes off a portion of the air flowing along a uniform trunk the velocity of air flow in the trunk beyond is correspondingly diminished; and since frictional resistance varies as the square of the velocity, there is a very marked reduction in frictional resistance. So important is this effect, that it was found that with a sufficient number of deflectors and gratings distributed along the sides of a uniform trunk of sufficient length the volume of air delivered was 93 per cent. of the delivery when no trunk at all was connected with the delivery side of the fan, there being, however, a trunk of about the ordinary length and size on the intake side, as would always be the case in a ship.

The deflectors themselves cause no material resistance. There is no difficulty in fixing them so that each gives practically the same delivery of air, a simple formula having been found by means of which this can be done without actual trial. The deflectors remote from the fan, where the velocity and pressure of the air in the trunk are small, require, of course, to be much more widely open than those close to the fan. Suppose the number of deflectors in a trunk is N, then the amount of opening of the Rth deflector will be $\frac{1}{N-R+1}$ multiplied by the width of the trunk; thus, for example, the last must be full open, the last but one half open, and so on.

In a new ship the deflectors are first adjusted in accordance with the above formula, and then with the fan running under ordinary conditions each delivery opening is examined to see whether the velocity of air current is approximately the same at any portion of the trunk proximal or distal, and the deflectors are adjusted until this has been attained; but once equality of velocity has been secured the deflectors should be permanently fixed so that unauthorized persons shall not tamper with them and cause too great a draught in one place and a lack of air in another.

In the case of branch pipes it was found best to place a deflector at the junction and so control the delivery through the whole of the gratings on the branch. Each grating on the branch should also have its deflector. It was also found that it made no measurable difference to the amount of air distributed whether the branches came off at right angles or at the usual angle of 30 degrees.

If each grating measures 18 by 6 inches, which appears to be a convenient size, one is required for every two men when 50 cubic feet of air per man per minute is supplied. This, of course, means a considerable number of gratings. On the other hand, the arrangement is simple, inexpensive, and efficient in preventing draughts and distributing air and warmth evenly throughout a compartment. Very favourable reports have been received from all ships so fitted.

Another great improvement effected during the war as a result of the Committee's recommendation is the introduction of a water-excluding ventilator, which is a modification of a fitting observed by the Committee in the French battleship *Courbet*.

Important compartments in the forward end of the ship, such as the seamen's latrines and the sick bay, both of which require specially good ventilation, were formerly entirely without it at sea, except in the calmest weather, simply because both the natural and artificial ventilation had to be closed to keep the water out. Now, however, the new fitting, by a combination of centrifugal action and drainage, guides any water which enters the ventilator back to the deck without permitting any of it to enter the fan or trunks. Consequently every compartment in the latest ships is just as well ventilated in the roughest weather at sea as it is in smooth weather.

Much, too, has been done to reduce the heat and stagnation of air in certain important compartments near the boiler rooms by the introduction of the traversing type of open propeller fan with the object of stirring up the air in accordance with Leonard Hill's results.

In 1915 the condition of living spaces during the long hours in which the ports and all means of natural ventilation have to be closed to exclude light came under consideration, and a number of light-excluding scuttle ventilators was supplied to every ship.

Special attention has been paid in the ships built during the war to the positions and ventilation of wireless offices, transmitting stations (which are the chief nerve ganglia in a ship), and to the space appropriated for treatment of the wounded during action, so that the atmosphere in each of them may be cool and fresh. Gunhouses and the silent cabinets in gunhouses have within the past twelve months been fitted with artificial ventilation which has been very favourably reported on by the Gunnery School at Whale Island. Destroyers are now fitted with pressure ventilating fans and the indirect system of heating the mess decks.

The ventilation of, and the method of purification of, the air in submarines have been greatly improved since the outbreak of war, and this is very clearly shown by the enormous reduction in the CO_2 content after long hours of diving. Traversing fans have been introduced into these vessels also.

Water Supply.

Before the war practically all drinking water consumed in ships in commission was distilled by their own condensers, but, for military reasons, a very large number of the smaller vessels and a few of the larger have, during the present hostilities, derived their water supply from the shore through the medium of water-carrying vessels, varying in size from small water boats of about 100 tons to large colliers. It was obvious from the commencement of this system that the transit from the standpipe on shore to the drinking tank in H.M. ships by way of hoses and tanks in water carrying vessels would be attended by a good deal of pollution, unless special precautions were taken, and even then some risk would be unavoidable; accordingly, the Admiralty issued orders that the work of cleaning tanks was in all ships to be carried out under medical supervision; that the clothing, including footwear, of the men who actually enter the tank was always to be previously disinfected; and that the work must be done by the ship, not by contractors, so that the men who carried it out could be under immediate control and supervision. Moreover, the process of supplying drinking water from standpipes on shore to tank vessels has for the past twelve months been under the supervision of naval medical officers, who draw up a few simple rules for the guidance of the men in charge of standpipes and for the masters of tank vessels. These rules are posted near the standpipes and in prominent positions in the tank vessels. Similarly the process of receiving water from a tank vessel into one of H.M. ships is always under the supervision of the medical officer of that ship or her parent ship, who

sterilizes the water with chloride of lime, however pure the source of the supply may be.

Further, a special naval medical officer is employed in

FIG. 1.—Neil Robertson Stretcher Open.

the sole duty of seeing that every precaution possible is taken to safeguard the water from pollution during its transit from shore standpipes to ship's tanks. He travels from port to port inspecting the water-carrying vessels to see that their fittings are in accordance with hygienic requirements and that the method of transferring the water is in accordance with the rules laid down by the Medical Department.

During the Gallipoli campaign a distilling apparatus of great capacity was set up in Mudros in order to provide the ships and the Naval Division with an ample supply of pure water.

As the sites of air stations have been selected primarily from a fighting point of view, the water supply, both as regards quantity and quality, has often proved a matter of difficulty and anxious consideration; it has then been necessary to arrange for sterilization by chlorination.

Unhealthy Occupations.

The composition used for the preservation of the fabric of aeroplanes contains material which, in civilian factories, has given rise to many cases of toxic jaundice, some of which have proved fatal. Although the Naval Air Service has used a very large amount of this "dope" no deaths, nor, indeed, any cases of illness entailing loss of service for a single day, have occurred. This fortunate result is to be attributed to widely disseminated information among the personnel as to the danger to be guarded against, efficient artificial exhaust arrangements (giving thirty changes of air per hour in doping rooms) and complete organization for extensive alternation of work.

The "dope" used in varnishing air-ship envelopes is of an entirely different nature, and in the absence of protective measures causes symptoms resembling acute alcoholism; but here again, although several hundreds of men are employed continuously at this work no ill effects can be traced to it owing to the efficient methods of immediately removing the fumes by a large number of powerful exhaust fans.

In our munition factories 5,000 men and women handle tri-nitro-toluene (T.N.T.), but no dust is allowed to collect, and the regulations for the protection of workers have been so strictly carried out that not only have there been no fatal cases, but there is no record of a single case of toxic jaundice. Although many authorities believe that the poisonous agent in T.N.T. is introduced through the skin, it is considered unjustifiable to allow the fumes of melting T.N.T. to escape into the general atmosphere of the room, and in all our factories artificial exhaust arrangements have been fitted to remove the fumes from their point of origin.

THE SERVICE AFLOAT.

BY

Deputy Surgeon-General ROBERT HILL, C.V.O.,
Principal Medical Officer, Grand Fleet,
AND
Fleet Surgeon E. A. PENFOLD, D.S.O., M.B., R.N.

ALL senior medical officers afloat of the Royal Navy appreciate the work of preparation which has been steadily going on for many years, most markedly in the last decade, in the Service. The plans laid down in peace time for the rapid expansion, when war should be declared, in personnel and stores, all bore fruit when put to the test in 1914, and this expansion still continues.

The installation about six years ago of high-pressure steam disinfectors in ships has, since the outbreak of war, proved of supreme value. Besides providing a weapon to combat the exanthemata and other infectious diseases as well as scabies, they sterilize clothing and dressings as frequently as may be desired. Another great improvement of pre-war times was the replacement of the clumsy service stretcher by the two forms of stretcher now in general use—(1) the bamboo stretcher designed from the Japanese stretcher by the late Fleet Surgeon Neil Robertson, R.N. (Figs. 1 and 2), which renders possible the removal of wounded from small compartments, down escapes in turrets, and round difficult corners with a minimum of danger and discomfort, and (2) the ambulance field service stretcher (Fig. 3), which enters so largely into the scheme for increased stowage space by the tier system, as explained further on (Figs. 4, 5, and 6).

At the outbreak of war the supply of stores and instruments increased automatically, and catgut, silk, and the like were sent to ships in portable tubes ready sterilized. The ships have always been on a war footing, but much has been learnt since the start of hostilities, notably the

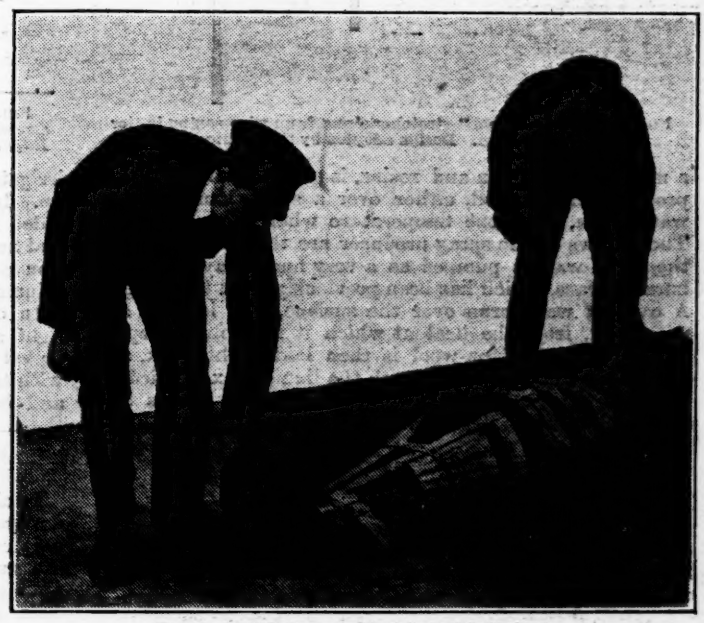


FIG. 2.—Neil Robertson Stretcher with Patient.

large number and severity of burns encountered in action. Pictures of bluejackets working their guns stripped to the waist are picturesque reminiscences of the past, but the battle of Jutland showed that exposed parts, such as face,

neck, hands, and arms, are very liable to be severely burnt.

For the evolution of the anti-gas apparatus thanks are due to Fleet Surgeon D. W. Hewitt, R.N., and Mr. A. Hutchinson, of Pembroke College, Cambridge. Their work goes to prove that the naval medical authorities are keeping pace with and countering the fresh devices of the enemy in this respect.

Burns.

The paraffin, or "ambrine," treatment of burns introduced by Médecin-major Barthe de Sandfort of Paris (late of the French navy) has been adopted by the Naval Medical Service afloat. A small slab of the wax, which is

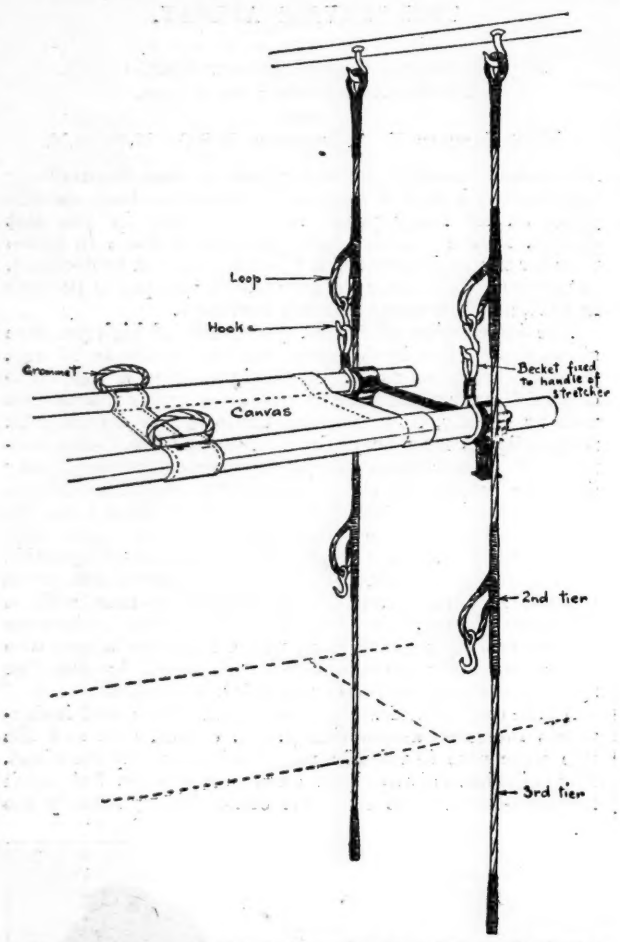


FIG. 3.—Bamboo "field" stretcher slung from wire roping in tier of three system. Design adopted by the Admiralty.

a mixture of paraffin and resins, is put into a metal spray producer and heated, either over a spirit lamp or in a water bath, up to the temperature when the wax melts. The bellows of the spray producer are then adjusted, and the liquid wax is pumped as a very fine spray on to the burnt surface, which has been previously dried thoroughly. A cake of wax forms over the surface, and is both air-proof and, from the heat at which it is applied, aseptic. A thin layer of cotton-wool is then laid on this wax, and the whole is again covered with the liquid wax applied by a brush. The results are very satisfactory; pain is certainly relieved rapidly, and subsequent dressings are almost painless.

Caisson Disease.

Another valuable adjunct to the medical service is the compression chamber fitted in one of the base ships for cases showing signs of caisson disease. It has proved very useful in the few cases in which it has been necessary to use it.

Dentistry.

The appointment of dental surgeons to certain ships in the Grand Fleet has been very valuable. Their services became necessary owing to the few opportunities which men had to visit the dental surgeons at the bases. The amount of work they have accomplished has proved of infinite benefit to the comfort and well-being of all hands.

Sick Bays.

The evolution of the sick bays from those of twenty years ago has advanced as rapidly as that of the ships themselves, and they are now well equipped. Situated well forward, the sick bay usually occupies the whole beam of the ship, and thus gets the advantage of scuttles on both sides for light and air. It is also ventilated by trunks from the upper deck, and this is of inestimable advantage when battened down at sea. The swinging cots, from eight to twelve in number, are slung on supports in the main portion of the bay, and arranged in two tiers with room between each group to nurse on both sides. There is also room for a few hammocks. The messing room is usually curtained off from the beds. The operating room is an excellent compartment with tiled floor, good light from both scuttles and electric groups, enamelled iron shelves, tables, and wash bowls, electric wandering lead and serviceable operating table. The supply of instruments comprises a major operating case, a minor operating case, a case of eye instruments, a set of silver catheters, Potain's aspirator, a small dental outfit, a sterilizer, splints,

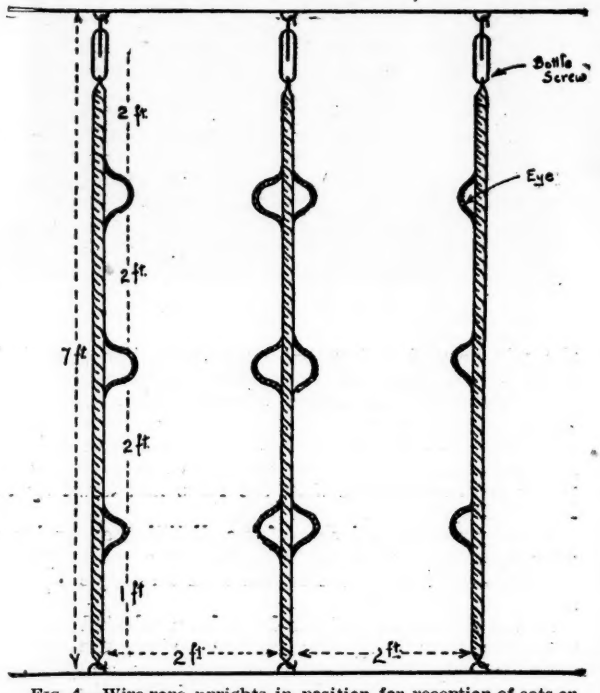


FIG. 4.—Wire-rope uprights in position for reception of cots or stretchers. Designed by Staff Surgeon Bringan, R.N., in H.M.S. *Edgar*.

irrigators, etc. The dispensary is well lighted and fitted up. In some of the newer ships a separate mess is provided for the sick berth staff. This is a great advance and much needed accommodation. There is also an isolation cabin, usually with two beds, which can be used as a junior officers' hospital.

In order to obtain all the advantages as regards space, light, and air, the sick bay must be situated in an unprotected part of the ship. This subject is closely connected with that of the accommodation for the sick and wounded and the medical staff during an action, and also after it, as the sick bay itself is likely to be shattered.

Distributing (Dressing) Stations.

In all modern ships there are two distributing stations designed in the construction of the ship, where the medical officers and their assistants are stationed in action; these are usually situated one in the fore part and one in the after part of the ship. They are designed so that they shall be, as far as possible, in the most protected parts of the ship, and for this reason there are many difficulties as regards space, ventilation, and temperature, these dressing stations being usually in close vicinity to boiler rooms or other engine-room compartments, which are necessarily in the most heavily armoured parts of the ship, and are

usually hot and the space limited. They are nowadays fitted permanently as dressing stations, with operating tables, shelves, cupboards, and other appliances, and are kept always ready in war time, so that when the ship prepares for "immediate action" only those stores, instruments, dressings, and so forth which are in daily use in the sick bay proper are removed to these stations.

Stowage of Wounded.

The stowage of wounded in the limited space available under armour has exercised the minds of naval medical officers for many years, and active service quickly demonstrated that the decks became too wet to be desirable or comfortable for the wounded; further, very few cots and stretchers could be accommodated in the space at our disposal. Much ingenuity has been displayed by various officers to increase this cot accommodation—Fleet Surgeon Lavertine, Staff Surgeon Bringan, and the late Fleet Surgeon Capps. In all their designs the tier system has been adopted. The two chief types produced are (*a*) the rigid wooden skeleton to hold cots or stretchers, and (*b*) wire roping, fitted with loops at intervals of 2 ft. to carry the stretcher, fixed to the beam above, and either fixed to the deck below or allowed to swing clear.

The committee appointed to report on accommodation of wounded decided on the wire-roping system, erected in single tiers for three stretchers, as the most useful. Figures 3, 4, 5, 6 show the different designs. This contrivance, rigged near the distributing station on both sides of the main deck, and in other suitable sites, increases the stowage room threefold—keeps the wounded

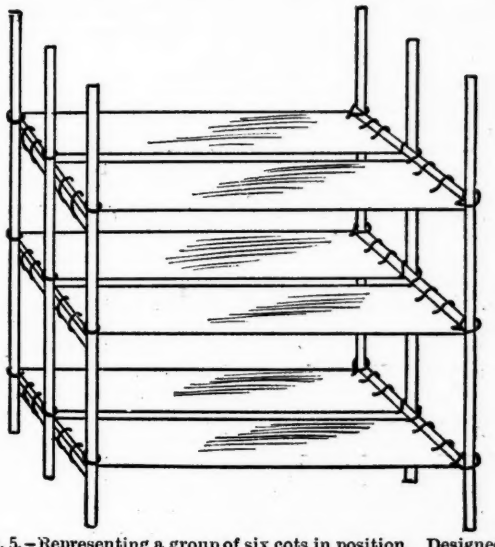


FIG. 5.—Representing a group of six cots in position. Designed by Staff Surgeon Bringan in H.M.S. *Edgar*.

off the wet deck, and places them in situations from which they can be easily attended to and moved should the disengaged side become the engaged one.

First Aid.

Besides the "first-aid" haversacks, boxes or cupboards for each gun are filled with single packages of dressings and other appliances, according to each medical officer's plan. Similar haversacks are usually supplied for the leading hands in charge of each stretcher party, and for every isolated position in the ship—that is, for each station in action where a number of men are isolated in various compartments such as conning tower, torpedo flats, gunnery and torpedo control positions, workshops, repair parties, engine rooms. The "first-aid" dressings supplied to these stations vary in amount according to the number of men stationed there, which may be from three to fifty men. It is also usual to have large tin boxes of additional dressings, tourniquets, scissors, splints, and other appliances in various accessible parts of the ship during action. These stores are used when there is any lull in the fighting, to replenish the haversacks or small boxes belonging to the guns and other stations without the necessity of coming to the medical officers in their usually distant stations.

It must be borne in mind that owing to the condition of a ship during and after an action, and to the excessive shock, even in the less severe cases of injury, it is advisable to avoid immediate operations.

Shock.

In order to combat shock the hypodermic injection of morphine is one of the most important duties of the medical officers during action, as this cannot be satisfactorily carried out by the best of lay assistants who have not previously been accustomed to it. No other forms of administration are entirely satisfactory, although commanding officers of destroyers in the early days of the war, when they were frequently in action, and before the appointment of surgeon probationers, had great faith in the small opium tablets with which they were supplied.

Sepsis.

The next most important duty in action is to combat sepsis, and although there is no soil contamination to be fought against, the wounds caused by shell are contaminated by all sorts of débris, resulting from shell explosion in a confined space, and the difficulties in the way of

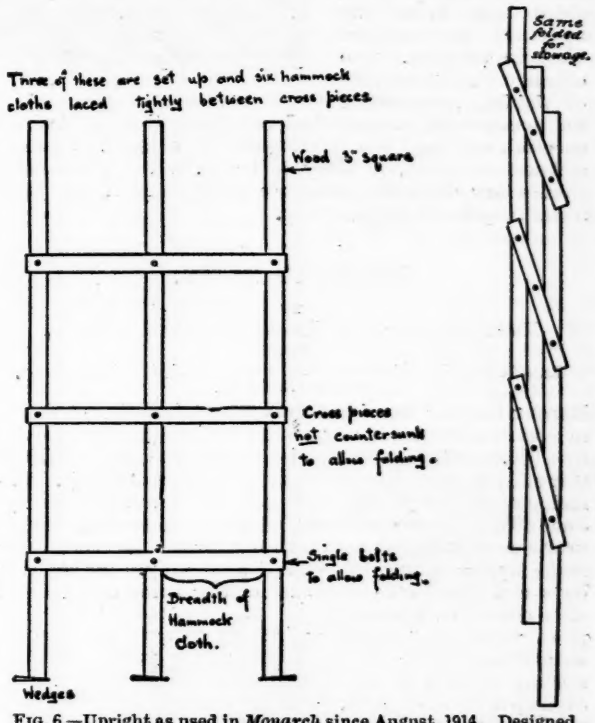

Same folded for stowage.
Three of these are set up and six hammock cloths laced tightly between cross pieces
Wood 3" square
Cross pieces not countersunk to allow folding.
Single bolts to allow folding.
Breadth of Hammock cloth.
Wedges

FIG. 6.—Upright as used in *Monarch* since August, 1914. Designed by Fleet Surgeon Lavertine.

cleaning the wounds are greatly increased if the hot water supply in the dressing stations has been cut off either by explosion there, or by destruction of the fresh water supply pipes in other parts of the ship. Recourse must then be had to the previously prepared stock of lotions and to iodine and rectified spirit. After combating shock and cleansing wounds, first dressings are applied and the patients made as comfortable as possible. After the action is over, or if there is a lull, it may be possible to do more in the way of surgery, but as the action may be resumed at any moment until the ship is outside the "danger zone," there will not be any time during which the ship is not liable to attack from the enemy, either by gunfire, torpedo, mines, or from the air, so that usually all that can be done is to remove the wounded to places previously arranged for, in all possible "protected" places, where their wounds can be redressed more carefully and splints applied to fractured limbs, and any immediate surgical work carried out.

Evacuation from Ship.

The evacuation of the wounded from a ship is a most important point, both from the wounded man's point of view and also for the efficiency of the ship. The ideal conditions obtain when a hospital ship can go alongside

the ship of war; then the wounded can be carried in their service cots and stretchers across a gangway to their beds. This, however, is rarely possible, and the services of the hospital carrier are called in as a go-between. In this case the wounded man is taken in his cot or stretcher and placed in the tray or cot carrier and hoisted out by means of a derrick into a hospital boat or barge, which transports him to a hospital ship, an ambulance train, or a local hospital, as circumstances command. The chief point to be remembered is that the less a wounded or burnt man is moved the better his chances of recovery.

Since the outbreak of hostilities the hospital ships have borne the brunt of the medical work in the fleet. The extreme undesirability of making preparation for action with several bed cases, whether medical or surgical, on board the fighting ship is evident. Cases of sickness or injury, if likely to be under treatment more than a few days, are therefore transported to the local naval hospital or hospital ship.

FIG. 7.—Ward.

HOSPITAL SHIPS.

BY

Fleet Surgeon E. C. LOMAS, C.B., D.S.O., M.B., F.R.C.S.Edin., R.N.,

Late Senior Medical Officer, H.M. Hospital Ships *Maine*, *Rohilla*, and *Garth Castle*.

BEFORE the war there was only one British hospital ship in commission, the *Maine*, which was originally fitted out by a group of American ladies during the South African war and subsequently taken over by the Admiralty. Unfortunately this vessel went ashore in a thick fog on June 19th, 1914, and was lost, but the arrangements for the provision of sufficient hospital ships for the fleet previously made by the Admiralty worked admirably. Within four days of the order to mobilize for war three ocean liners were converted into hospital "carriers," and with their medical and nursing staff, and full equipment of cots, bedding, and medical and surgical stores complete, which had been kept ready in a lay-apart store at one of the large medical dépôts, were at sea, where any necessary alterations were completed by the artisan ratings, so that they joined up with the fleet ready for any emergency.

In the meantime work was being pressed forward in six other ships intended for more permanent service from plans which had already been prepared during peace, so that they were ready for sea in about three weeks or less. These vessels were mostly intermediate liners, in which the passenger accommodation and cargo space were easily adapted to their new purpose. The swinging cots fitted averaged about 220, but additional emergency accommodation was provided for about 300 more patients. In the Mediterranean this number was sometimes largely exceeded, over 900 cases being conveyed to a base hospital on one occasion.

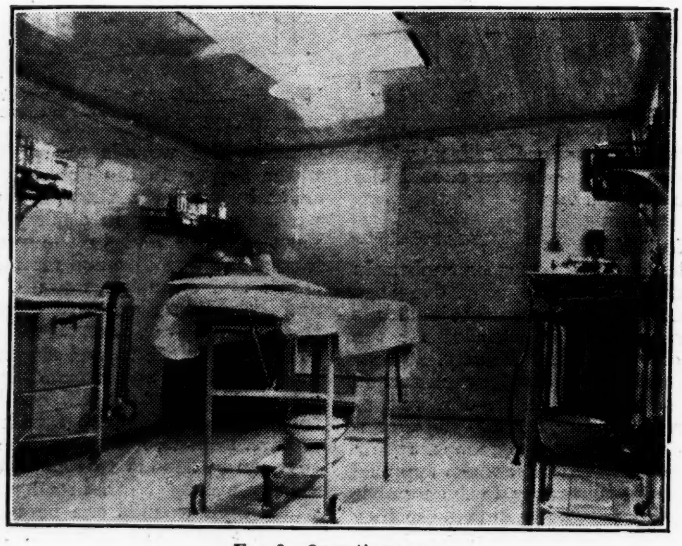


FIG. 8.—Operating room.

As a rule there are six or seven wards for men (Fig. 7) and two or three for officers, which were adapted by converting portions of the saloons or removing cabin bulkheads, some officers being also nursed in cabins. A padded room for mental cases was also prepared. The decks are covered with green corticine, which is easily kept in a high state of polish; the bulkheads and cots are enamelled a very light green. Ventilation is maintained by means of scuttles, supply and exhaust cowls, and special motor-driven supply ventilators. The wards occasionally became rather hot at night when dead-lights had to be closed; but this was corrected by Fleet Surgeon M. H. Knapp's plan of fitting the cylindrical portions of ordinary wind scoops with partial diaphragms which occupy about two-thirds of the circumference, so that while air is freely admitted no light shows through. Other alterations included the fitting up according to the existing plans of dispensaries, pantries, latrines, mortuary, disinfector for clothes and bedding, cot lifts both inside and outside the ship, *x*-ray room, laboratory, laundry, operating rooms, and many other necessary adjuncts of a self-contained hospital. These necessary fittings had also all been stored in readiness before mobilization.

The operating theatres are installed either in music rooms or saloons, or in specially constructed erections on the upper deck (Fig. 8). In the former case the somewhat ornate walls are covered in with match-boarding enamelled white. The rooms are divided into two parts with separate entrances and sliding doors between—one half being used as a preparation and sterilizing room. The decks are tiled and all the tables, shelves, and other structural arrangements are of the aseptic pattern. In spite of their extemporized character, it does not appear that any case of sepsis could be definitely attributed to faulty surroundings.

The cot-lifts which serve the wards are placed near the operating rooms so that the exposure of a patient after anaesthesia is reduced to a minimum. The original supply of instruments and medical and surgical stores met the initial requirements; but subsequently, as it became necessary, further equipment was provided by the Admiralty.

General Duties.

On the Home Station the work of the hospital ships is to a large extent similar to that carried out by the *Maine* in peace time. The Fleets at their different bases—often in remote districts where no shore accommodation is available—are attended by one or more ships. When nearly full they are either cleared by smaller hospital ships which convey the patients to a convenient rail-head for further transference by ambulance train, or at stated

intervals the hospital ships are relieved by others, steam to a railhead to discharge their cases, and are then coaled, provisioned, and if necessary repaired or refitted.

It soon became evident that any preconceived ideas of hospital ships proceeding to the scene of an action had to be discarded. Apart from the difficulties of transporting wounded men from the fighting ships in bad weather at sea it was obvious that the conditions of modern naval warfare precluded these ships from remaining with their engines stopped without running grave risk of being torpedoed by submarines.

Embarkation.

In harbour the conveyance of patients is carried out by converted drifters or in ships' picket boats and cutters. Some of the former are fitted to take eighteen cot cases under cover, and in bad weather are far preferable to ships' boats. On arrival alongside, the cots are hoisted in, by hydraulic or steam cranes, in a tray which would take either a service cot or a stretcher (Figs. 9, 10, 11). The original trays were gradually improved upon, and were fitted with a removable end or side, whereby the process of transfer is much facilitated. When comparatively large numbers of men wounded in action have been brought in by destroyers and light cruisers, it has been found quite possible to get these vessels alongside the hospital ship, which considerably accelerates the transfer.

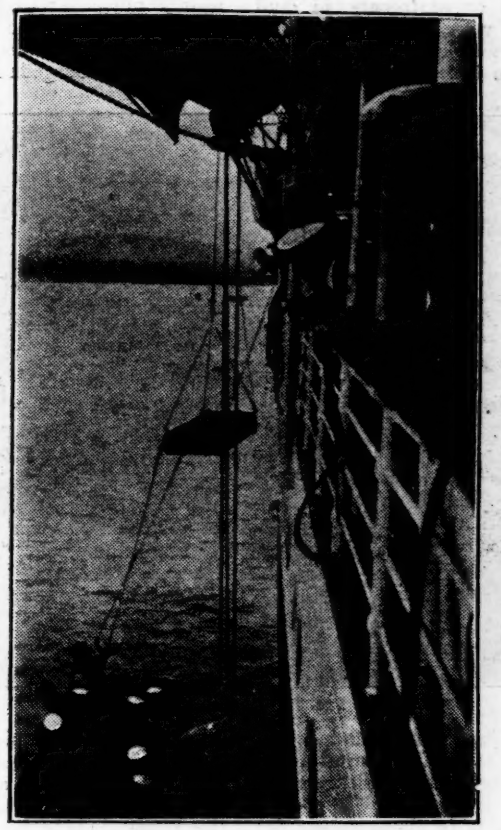


FIG. 9.—Cot case coming on board from a ship's boat.

Opinions differ as to what class of cases should be dealt with by hospital ships after an action and what transferred further by ambulance train. There is much to be said for the view that the very severely wounded and those suffering from much shock are more satisfactorily dealt with in the former. The transference from a fighting to a hospital ship is accomplished with the minimum of disturbance; and, as now equipped, these ships are capable of dealing with anything. After the Jutland battle there was a considerable number of patients with severe burns who certainly could not have borne a long train journey; their care entailed heavy work on the staffs of the ships which received them. It must be borne in mind, however, that when cases on board hospital ships that can travel by train are retained, there are no means of dealing with a fresh lot of wounded that may come in at any time. The hospital ship is, in fact, demobilized *pro tem.*, a most undesirable proceeding.

Staff.

The medical staff consists of one fleet surgeon in charge, six other medical officers, and a dental surgeon. A chaplain also is borne. The surgeons in the first instances, in addition to active service medical officers, were drawn from the

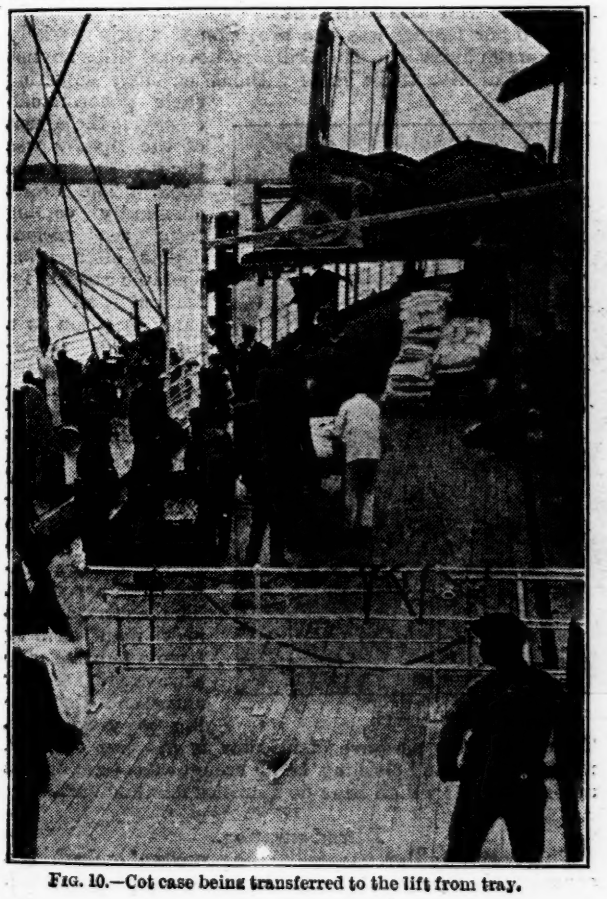


FIG. 10.—Cot case being transferred to the lift from tray.

FIG. 11.—Cot case being lowered into the wards by the lift.

Royal Naval Volunteer Reserve, amongst whom were many holding honorary hospital appointments in civil life. Extremely valuable services were rendered by these officers, among whom were bacteriologists, ophthalmic surgeons, and *x*-ray experts. As time went on, special departments were gradually developed, with the result that a degree of efficiency has been obtained remarkable for a floating hospital.

The nursing staff consists of four Royal Naval or Reserve Nursing Sisters, and some thirty-five men, of whom about one-third belong to the regular Naval Sick Berth Staff and the remainder to the Reserve. The latter, drawn mainly from mining and manufacturing districts, were well trained in ambulance work, but as their nursing capabilities were naturally of a less high order, much responsibility fell upon the Sisters, who have admirably justified their calling. The remainder of the complement includes carpenter ratings, master-at-arms, and ship's corporals for baggage and police duties, writer, and signalman.

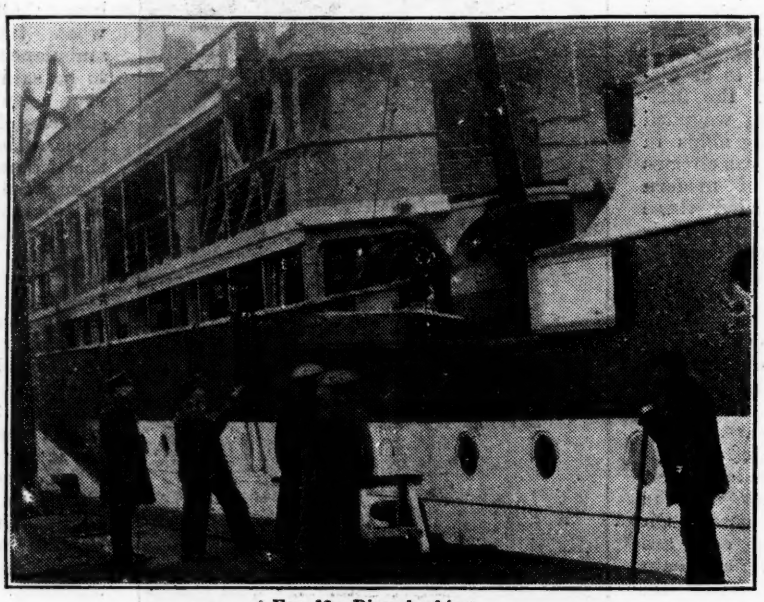


FIG. 12.—Disembarking

Improvements are constantly made in these ships; for instance, in the *x*-ray room of the *Garth Castle* aërial leads were installed, viewing boxes and adjustable carriers for water-cooled tubes made, and many other accessories fitted up by the ship's artisans and electrician under the supervision of the surgeon in charge of the department.

In the laboratory the ordinary clinical and pathological examinations are carried out, and facilities provided for culture work and the thorough investigation of cerebro-spinal fever contacts and carriers. For examination of acuity of vision, especially that of gun layers, all the hospital ships are provided with trial glasses and a dark room, where an ophthalmic surgeon or other member of the staff with a good working knowledge of sight testing and retinoscopy is always available. Among the temporary surgeons there are several gynaecologists, and their surgical experience is turned to good account on more general lines. On one occasion a successful Caesarean section was performed in a remote district where no other professional aid was obtainable. The operative work is often heavy, the cases being those ordinarily met with in a naval hospital. Appendicitis is fairly common, and on one occasion seven gangrenous cases were operated upon in one day.

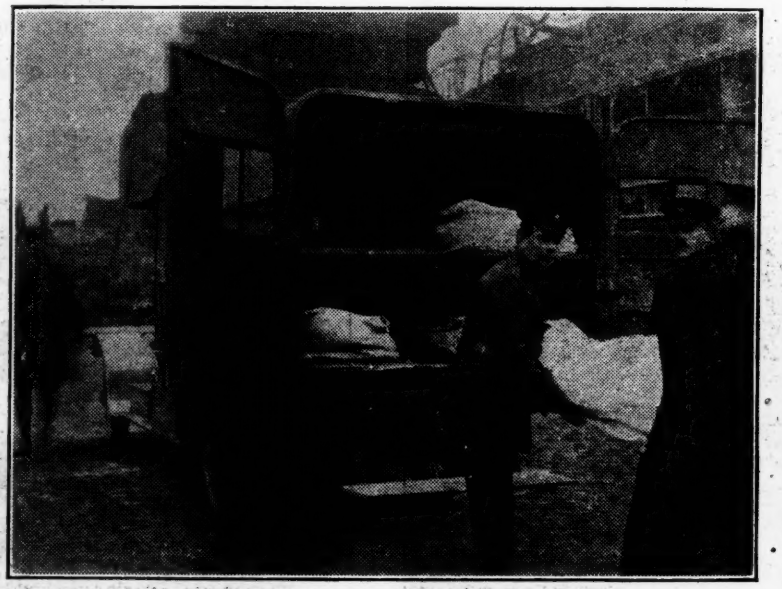


FIG. 13.—Disembarking: Removal to Motor Ambulance.

In the *Garth Castle* iodine was mainly and successfully used for the cleansing of wounds, skin preparation, catgut, etc. Hypertonic saline solution was also much in vogue, both for arm and leg baths and as a dressing. The formula used was a solution containing 0.85 per cent. sodium chloride with 0.25 per cent. of sodium citrate. The results obtained were excellent; septic wounds and burns became clean and healthy in a wonderfully short space of time. Fleet Surgeon A. R. Bankart's apparatus for obtaining a solution containing free chlorine by the electrolysis of sea water proved quite efficacious.

The dental surgeons are always busy, and are of immense service to the personnel of the Fleet. At one time there were three of these officers living in the hospital ship at a certain base, the foremost operating and preparation rooms being given up to them. The equipment supplied is very complete.

Two features were introduced which proved of the greatest benefit to the Fleet. The first was the systematized use of galyl in all hospital ships. At first patients requiring this treatment were sent to the South of England, occupying valuable beds in hospital carriers and trains, and their services were lost for a considerable period. Later on such patients were sent to the hospital ships for two or three days, the injection was given, the particulars entered in their special history sheets, and they then returned to duty until due for their next dose. Whatever hospital ship was present then carried on the treatment, with resulting economy of time, money, and service. Systematic examinations of the urine for arsenic were also carried out.

The other feature was the provision of a ship specially for zymotic diseases. The ordinary hospital ships are not able to deal with these cases without seriously impairing their general efficiency, so the advent of the *Agadir* was the greatest possible boon. The drafts constantly coming from the various dépôts often bring sporadic cases of infection, and their early isolation is a matter of importance. The laundry and disinfecting plant are two other items in constant request. Clean bed linen and patients' clothing went far towards giving the ships their reputation for always looking fresh and sweet. The contrast to a sick man coming from a fighting ship always prepared for action and often coaling is very great. The large high pressure disinfector is in great demand, much bedding and clothing being brought from auxiliaries and small craft which have no facilities for this work.

Disembarkation.

This is simply the converse of the process of embarking a considerable number of cases. As has already been stated, it is done in two ways—that is, either by discharging

to a smaller hospital ship which came alongside or by the ship herself proceeding to a port with rail facilities. In the latter case, the number and class of cases having previously been telegraphed, a fleet of motor ambulances and baggage lorries is in attendance on the jetty as soon as the ship is tied up. The clerical work, sorting of baggage, labelling for the different base hospitals, etc., has all been completed on the voyage, so that little time is spent over the actual disembarkation. The requisite number of cots are placed in readiness in each ward, and the patients who are unable to walk placed in them. Baggage and walking cases are got out first, the latter proceeding down a brow or the ship's gangway ladder. The cot cases are then brought up in rapid succession in the lifts, transferred to the tray, and hoisted out. Padded trestles are placed on the jetty to receive the tray, and the cots are transferred to the waiting ambulances (Figs. 12, 13). The canvas cots are uniform and interchangeable with those of the ambulance train, so that there is no further disturbance of the patient, the same number of empty cots being received from the train.

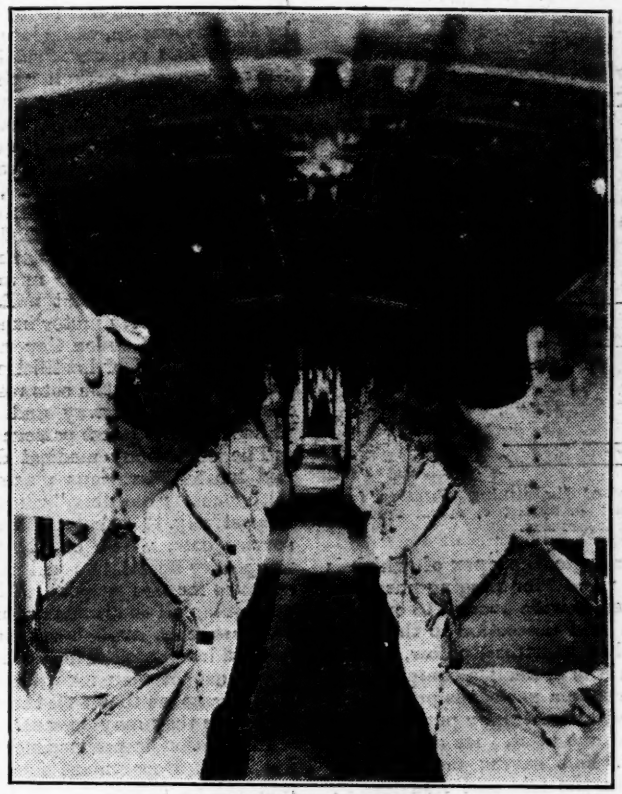


FIG. 14.—Showing cots slung in ambulance train.

The Naval Medical Transport Department now takes charge of the cases, so that when the last patient and kit-bag are over the side the professional work of the ship ceases for a short space, and a proportion of the staff are enabled to get well-earned leave as the last weeks of the round trip are always strenuous.

ACCOUNT OF LAND MEDICAL TRANSPORT ARRANGEMENTS OF THE NAVY.

BY

Surgeon General SIR JAMES PORTER, K.C.B., K.C.M.G., M.D., R.N.,

AND

Staff-Surgeon A. VAVASOUR ELDER, R.N.V.R.

THE removal of sick and wounded from the scenes of their activities to the seclusion of a hospital is no small factor in the general work of the Medical Department of the Navy.

To deal with this phase of medical work a special medical transport organization has been created. There is a central office at the Admiralty for the Principal Medical Transport Officer, and thus in immediate touch with the department. Medical Transport Officers are established at the chief naval ports, and finally Assistant Medical Transport Officers have been appointed at all places round the coast where wounded are likely to be landed after action. At each of these places provision has been made for establishing dressing stations and temporary hospital accommodation for a certain number of cases until such time as an ambulance train can be sent to remove them to base hospitals elsewhere.

One of the difficulties of the problem of dealing with naval cases after action is the impossibility of arranging in advance or foretelling exactly at which spot and in what numbers wounded will be landed. Certain obvious bases, it is true, exist, to which ships able to do so would naturally return after an action. But at the same time these bases are wide apart, leaving large gaps of coast line with many ports, into any one of which rescue vessels and smaller damaged vessels might be compelled to enter and discharge their wounded. Hence the establishment of what are termed emergency medical dépôts, with Medical Transport Officers in charge of each at various places along the coasts. Thus no likely place is left without means of coping with a sudden inrush of wounded and rendering medical aid to them.

Briefly, from the time a wounded man is landed from a ship until he is finally placed in hospital, he is in the charge of the Land Medical Transport branch of the Naval Medical Service. The system adopted by the Navy differs from others in so far that when a man is wounded severely enough to require immediate treatment in bed, after having received medical attention, he is, so to speak, put to bed in

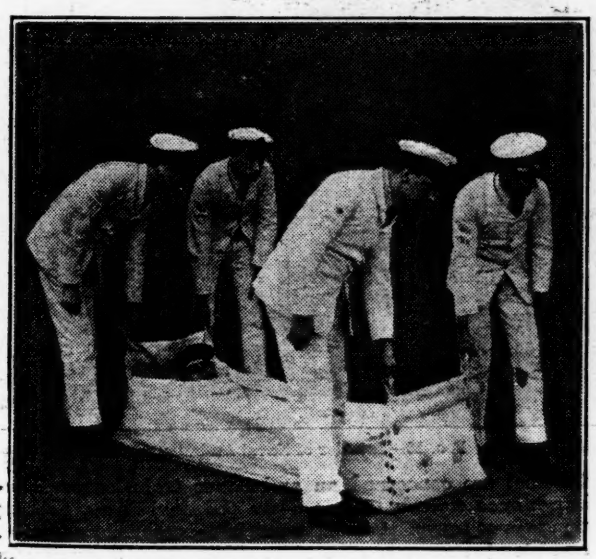


FIG. 15.—Showing method of carrying cot. Summer dress.

FIG. 16.—Showing method of carrying cot. Winter dress.

his ship in a standard naval cot and made as comfortable as possible in the circumstances. The naval standard pattern cot is composed of canvas stretched over a wooden frame and laced together. At each end of the cot the canvas is extended into a triangle, the apex of which is fitted with a lanyard and an "eye" for slinging purposes, while the canvas at the sides is wide enough to overlap, and so affords extra warmth and protection to the occupant. Each cot is fitted with a mattress, pillow, pillow-case, and two blankets. Thus it is in itself a complete bed wherever situated. From the time a patient is placed in a cot on board a fighting ship until he is finally put to bed in a hospital he is never moved out of it. He and his cot travel together all the way, thus saving much of the pain and suffering involved in the frequent transfers by stretchers, ambulances and trains.

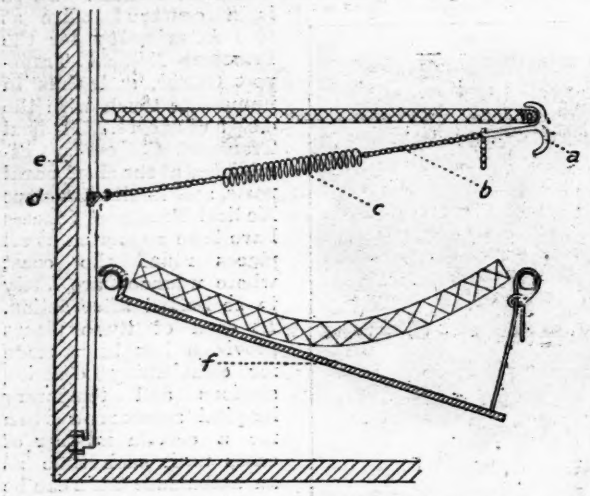


FIG. 17.—"Gripe" and method of diminishing vibration for fracture cases. *a*, Anchor hook; *b*, chain; *c*, spiral spring; *d*, traveller; *e*, side of coach; *f*, fracture slat.

To carry this out all the ambulance trains, motor ambulances, bearer-parties, and so forth, have been specially organized in a standard and uniform manner with regard to each individual link of the transport chain. This may be best described by tracing the journey of a patient from the commencement. The patient and his cot complete with bed and bedding are landed from the ship and turned over to bearers specially trained in the handling of cots. These bearers are drawn from ratings of the Royal Naval Auxiliary Sick Berth Reserve attached to the Medical Transport branch in the case of large naval centres, and in other places they are drawn from Voluntary Aid Detachments of the Order of St. John of Jerusalem in England and the British Red Cross Society. The bearers carry the cot to the ambulance or ambulance train as the case may be, and there it is placed in position. In exchange for the "loaded cot" the ambulance or the ambulance train gives a clean, empty, and fully-equipped standard cot for return to the ship from which the patient was received. In this manner the fighting ship always maintains her complement of clean cots.

When an ambulance or train is filled it moves off to its destination, and on arrival, the same exchange of cots is made as before, and so on throughout each link until the patient is finally taken out of his original cot and put in bed in hospital. By this method there is a constant outgoing stream of clean cots from the base to the ships at sea all ready for further service. Everything connected with the land transport of wounded is maintained in a state of immediate readiness, and finally, and most important of all, the wounded themselves are spared the sufferings caused by repeated transfers from ambulance stretcher to ambulance train and back again to another ambulance stretcher, etc. Also the time taken thus to empty an ambulance train is very brief, and the delay to ordinary passenger traffic practically *nil*. At the large naval bases arrangements exist for the cleaning of all cots and bedding, and a store of clean cots for exchange purposes is also established.

In the ambulance trains the cots are suspended in two tiers from the roofs of the coaches. They are prevented from swinging by a spring clip, devised by Staff Surgeon Elder, which presses the cot against two padded buffers built in to the side of the coach. By this method the cot and patient do not form a component part of the coach. The jolting of the train over the metals is largely taken up by the suspension, while lateral jars when rounding curves and the like are absorbed by the padded buffers. Thus the cot has just enough "play" for comfort and *no more*, while the train is under way. The tension of the spring clip is adjustable at will, and, unlike the "fixed bunk" of military ambulance trains, every jarring movement of the coach is so minimized as practically not to disturb or distress the patient. Moreover, the coaches themselves when empty of cots have no fittings except a few chains and hooks, and are easily cleaned and disinfected.

As regards the ambulances in general, beyond being fitted specially to take naval cots instead of the military stretcher, they present nothing else of interest except a squadron of thirty motor buses. These buses were taken over from the London General Omnibus Company at the commencement of hostilities and were fitted with spring trestles on which the cots rest. They have proved satisfactory in every way and are just as comfortable for patients as the latest pattern specially built ambulances.

The emergency medical depôts previously referred to and located at various places along the coast are supplied with "cot," "clothing," "hospital," and "medical units" respectively. The cot unit consists of completely equipped service cots, which can be used to form the nucleus of a temporary hospital in suitable local buildings selected in advance for this purpose. The hospital and medical units containing all the necessary utensils, drugs, and dressings, etc., are kept available for immediate use in these extemporized hospitals. The clothing unit, as its name implies, is for use of men suffering from immersion and lack of clothing, so as to enable them to proceed in dry clothes to wherever they may be sent.

In addition to preparedness for "The Day," the Medical Transport Department is continuously engaged in the removal of ordinary sick from the fleet at the various ports. The unloading of hospital ships from the fleet and overseas is also part of its duties. As far as the sick from the fleet are concerned, an ambulance train leaves Edinburgh once a week, travels down the East Coast, picking up cases at towns previously notifying cases for removal, and then proceeds to Plymouth, where cases belonging to

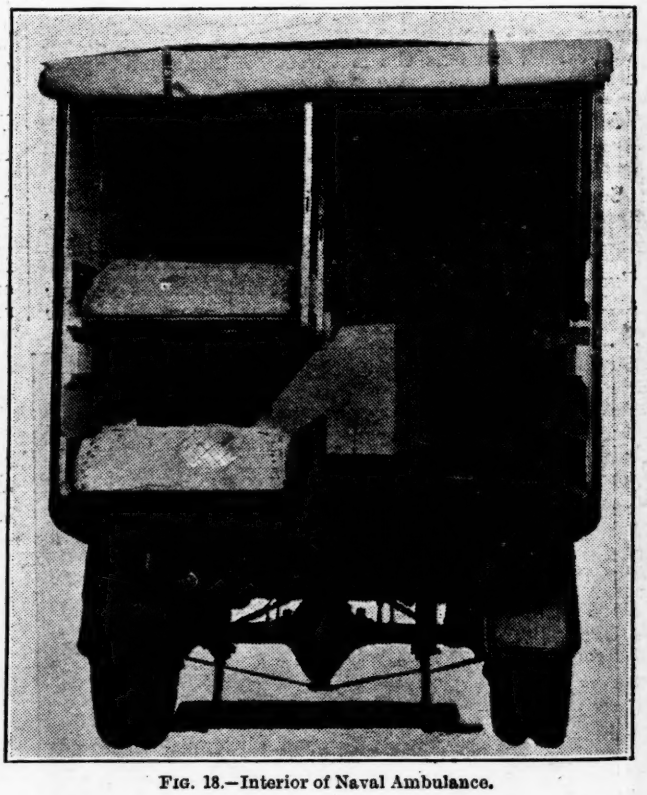


FIG. 18.—Interior of Naval Ambulance.

that port are transferred to hospital. From Plymouth the train goes to Gosport, and thence to Chatham, where the journey ends, landing cases at their respective hospitals in each place. Thus the sick are taken each to his home port, and in close touch with friends and relatives. The round journey from Edinburgh to Chatham takes about thirty-four hours. During this time the patients are fed, each according to his prescribed dietary scale. In fact, everything is done for them while in the train. No stops are made except for gas and water or railway requirements when they arise. Owing to the pressure on the railway systems in the north of Scotland the full-sized ambulance trains do not as a rule proceed north of Edinburgh. Cases are brought as far south as Edinburgh from the north by a smaller train, a class of conveyance also found convenient and economical for distributing smaller numbers of cases to auxiliary hospitals, and so aiding in keeping the sea coast hospitals from congestion in emergency.

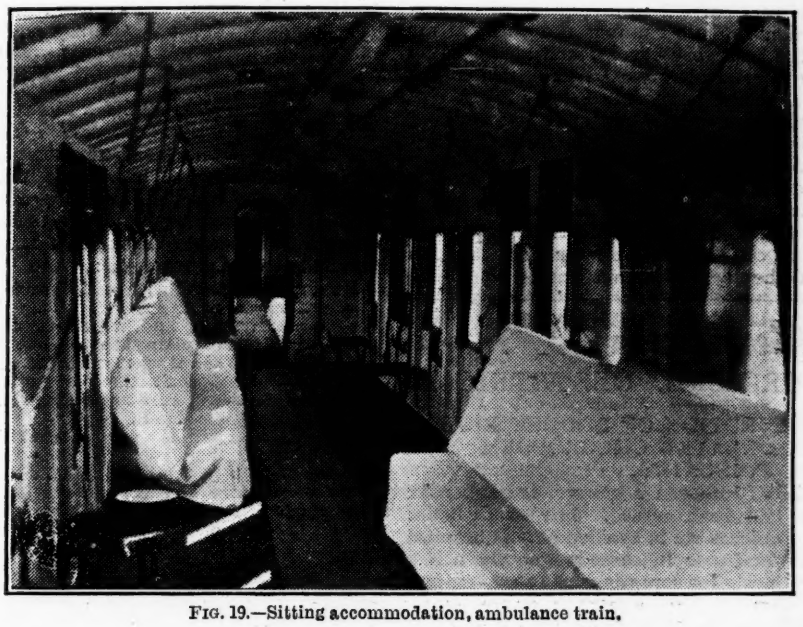


FIG. 19.—Sitting accommodation, ambulance train.

A full-sized naval ambulance train carries 136 cots and a smaller sized train 40 cots and 36 sitting cases. On routine journeys only the number of patients which a train has cot accommodation for are carried as a rule, so that every patient has a cot to sleep in at night. During daylight hours sitting accommodation is provided for non-cot cases by stacking two cots on the floor all along one side of the coach, a third cot being placed sideways on the uppermost one, and resting against the side wall of the coach. This forms a back-rest, and by this means very comfortable sitting accommodation is obtained which allows the men to sit back and stretch their legs, without interfering with or being disturbed by the ordinary traffic through the coach. Washable canvas covers are supplied for use when cots are thus stacked to keep them from being soiled. At night the cots are slung in position and the coach transformed into a dormitory.

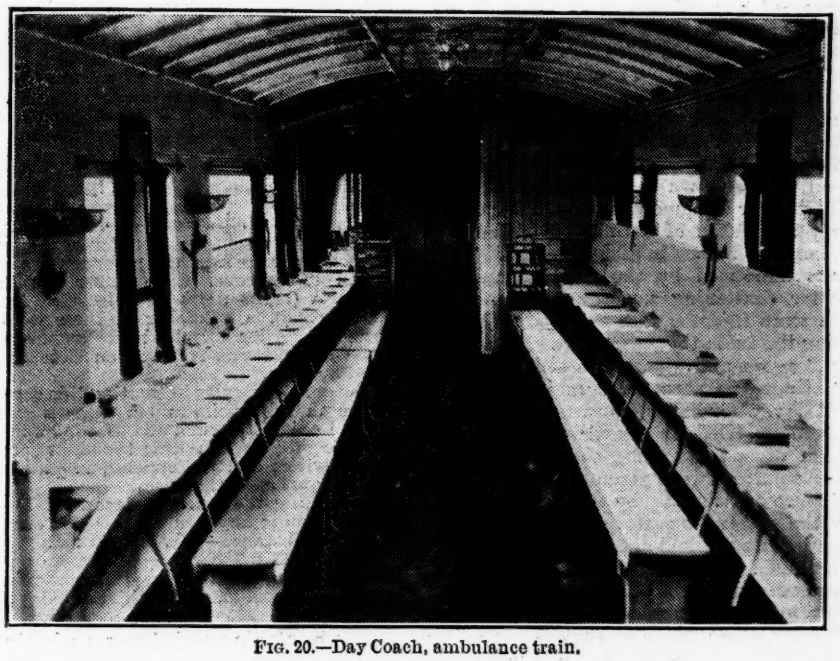


FIG. 20.—Day Coach, ambulance train.

All the trains are self-contained and, when in motion, self-supporting, carrying everything in the way of provisions, stores, and so forth, likely to be required on the journey.

The staff consists of two medical officers and thirty-six men, including cooks, clerks—all Auxiliary Sick Berth Reserve ratings—who live in the train continuously. In fact, the trains are practically commissioned like ships and worked as such in the way of duty, regular sea watches being kept day and night. For ordinary routine journeys nursing sisters are not carried, but a cabin is set apart for two in each train for use when required, as after a naval engagement or when any cases calling for their presence are being transported. The nursing itself is done, as in the navy afloat, by trained male Sick Berth ratings.

An interesting feature of the large naval ambulance trains is what is known as the "Day Coach." It is fitted along the sides with sections of flap tables, lifting upwards, at which non-cot cases can sit and have their meals or do anything else. Under these tables is a row of wash-basins connected with water supply. These are for use after a night journey or as required, and become available by lifting up the flap table. At one end of each of these coaches two padded rooms are fitted for the more violent mental cases.

A small dressing station supplied with instruments and drugs is also provided. It may, however, be stated here that, practically speaking, there is very little to be done in the way of "dressings" except while the train is at rest. For this reason also no "operating theatre" has been arranged, on the assumption that a case likely to require operation would not be travelling, and also, if such a case were encountered, operative measures would probably have to be applied at the cot side—time would not permit of the case being taken to the "theatre"; or, alternatively, the patient would be landed at the first opportunity.

A portable electric signalling device is fitted at each end of the train and coupled up with the engine, so that communication can be made with the driver by means of a code of signals with reference to speed, heating, etc. The principal parts of the train are connected by intercommunicating telephone. The trains are lighted by electricity—dynamo while running and accumulator when at rest. Electric fans are fitted where requisite, and portable lights are

arranged for in all the ward coaches. Gas is used for cooking only, and is carried under the kitchen cars and one car adjoining each kitchen, the cylinders being coupled up together; thus the danger of fire is reduced to a minimum. Heating of the coaches is by steam from the engine, carried in overhead pipes suspended from the roof. While running the internal air current circulates the heat very evenly, and at the same time the floor space is clear of any obstacle which might get in the way of a bearer party while handling a cot. Sanitary arrangements are ample—about 10 per cent. of the carrying capacity of each train, and consist of water-sealed pans. Arrangements are made for "trapping" these while trains come to a halt for any length of time. Large storage capacity for water, domestic and sanitary, is supplied to each train. For administrative purposes a small office is fitted up centrally in the train, and contains typewriter, safe, and the usual office furniture.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

INTRAVENOUS INJECTION OF SODIUM BICARBONATE IN DELAYED CHLOROFORM POISONING.

On January 12th, 1916, I removed a gangrenous appendix from a soldier who had been gassed. The anaesthetist began with ether, as chloroform is avoided at this hospital in acute appendicitis and also in cases where there has been starvation or vomiting for some days before operation. It was soon found, however, that ether was dangerous in this case, causing extreme cyanosis and profuse bronchial secretion, owing probably to the bronchitis that still remained from the "gassing," and it was decided to continue with chloroform, which the patient took well.

Next day the temperature had fallen, the pulse was good, there had been little or no vomiting, the abdominal condition was quite satisfactory, and the patient seemed much better and was reading the newspaper on my arrival. He had been getting sodium bicarbonate by the mouth and was taking fluids well.

Two days after the operation the house-surgeon reported that the patient was very sleepy, and was beginning to get jaundiced. Calomel and enemata were given, but the drowsiness increased. On the third day he was very yellow and in a state of coma, from which he could not be roused; it was accompanied by restless movements of the head and body when attempts were made to examine the pupils or to pass the catheter. Urine and faeces were passed involuntarily, and no specimen was procured to be tested for acetone and diacetic acid. To all the surgeons who saw him the diagnosis seemed obvious—secondary chloroform poisoning—and the outlook hopeless. His relatives had come from another town to see him, but he could not be roused. Hoping for a temporary rally, I decided to inject intravenously a solution of sodium bicarbonate, as recommended by Langdon Brown in diabetic coma.

The incision was unnoticed by the patient, and two pints of sterile water containing five drachms in all of sodium bicarbonate were injected into the median basilic vein. Before leaving the table the patient drawled out the words "Oh, I say," again and again, but still could not be roused, and continued to pass urine and faeces unconsciously till next day, when a slight return to consciousness was noticed, and he tried to answer questions, but at first with no sign of understanding them. A pint of sodium bicarbonate solution was given subcutaneously every six hours and also occasionally by the rectum.

Two days after the intravenous injection the return to consciousness became more marked and he began to talk a little, but seemed childish. On the third day the mental condition was practically normal. The appendix wound healed by first intention, but convalescence was delayed somewhat by an abscess in the pectoral region caused by the repeated subcutaneous injections, when the patient was restless, making it difficult to avoid sepsis. Otherwise recovery was uneventful and complete.

The interest of the case lies in the fact that recovery took place even after the onset of coma with involuntary passage of urine and faeces. In most cases of delayed chloroform poisoning (of which I have, unfortunately, seen several), the pulse is rapid and weak, the patient is breathless before the onset of coma, and death is almost certain when this stage is reached. Whether intravenous injection of sodium bicarbonate solution can avert a fatal ending in any of these is doubtful, as in the case recorded above the pulse was never weak and running, but the treatment is, at any rate, worth a trial.

George G. Farquhar, F.R.C.S.,
Honorary Surgeon, Darlington Hospital.

CASE OF TETANUS SUCCESSFULLY TREATED WITH ANTITOXIN.

The following case is interesting not only on account of the success of the treatment adopted, but also owing to the probable mode of infection. The patient was a boy, aged 16, who worked in the gardens of a reformatory school, and probably infected himself with tetanus by scratching irritable vaccination marks with fingers contaminated with garden soil:

He was vaccinated with calf lymph on August 29th. The vaccination ran an ordinary course until September 10th, when the two scabs were knocked off by a boy in play. On September 14th he complained to the nurse matron that his arm was painful. When it was found that the arm was swollen and inflamed and the vaccination sores were discharging pus, mild antiseptic dressings were applied, and in a few days the arm was apparently quite well.

On September 23rd the boy reported himself sick to me, when I saw him for the first time since his admission. He complained of pain in the back, and that his vaccinated arm was sore; there was no pyrexia and the tongue was clean, but the vaccination marks showed as two ulcers with surrounding local inflammation, and the axillary glands were swollen and tender. He was sent into the school hospital for observation, and the arm was dressed with weak lysol. On September 25th he complained of severe pain in the back and stiffness in the muscles, which he said "passed off and then came back again." I was called in the afternoon and saw him at 6 p.m., when tetanus was evident. The spasms were characteristic, and risus sardonicus was present. Serum was not obtainable until 12.30 a.m., and then only 1,500 units. The dose was injected under the skin without chloroform anaesthesia. When I began to withdraw the needle it broke off in its entire length (1½ in.) owing to a very violent spasm; the needle was left *in situ* (the skin of the thigh). On September 26th more serum was not available, but the boy's condition was worse, the spasms being more frequent and more intense. His temperature was 99.2°, pulse 100 to 120. Slides from the discharging sores on the arm showed club-shaped bacilli; these were recognized as "presumably *B. tetani*" by Mr. W. Gough of Leeds.

On September 27th serum was at last obtained; 3,000 units were given in the early morning and another 1,500 at night. All injections were given hypodermically under chloroform anaesthesia.

The boy had become progressively worse (twenty-eight spasms were noted within three hours at night), there was marked opisthotonos, and occasionally pleurothotonos was noted; there was cyanosis, most intense during the spasms, with profuse perspiration. The breathing was much embarrassed, and he had bitten his tongue, which was a source of much trouble in feeding. The temperature was 99.8° (the highest recorded during the illness), the pulse-rate 100 to 140; chloretone in 5-grain doses every two or three hours and chloroform inhalation during the spasms were ordered as the occasion required. On September 28th there was no change; 3,000 units were injected. The tongue was much swollen, with septic lacerations on either lateral margin; hydrogen peroxide and thymol were used frequently for swabbing, etc.

On September 29th the spasms were less frequent; he had begun to improve. On October 3rd he was covered with urticaria (13,500 units were injected from September 26th to October 2nd). On October 6th there were two spasms, the last recorded. After this he made an uneventful recovery. The broken needle was removed on October 20th through a superficial incision.

The great difficulty in treating this case was to obtain serum. There was a Zeppelin raid in progress on the night of September 25th; I only got serum, and that in an insufficient quantity, by motoring thirty-six miles; the night journey was enlivened by the activities of the Zeppelin, and the zeal of the policeman professional and otherwise.

In treating the case, the lacerated tongue rendered feeding most difficult; any form of gag—for example, a piece of wood or other substance—provoked spasm.

Chloretone made the spasms less painful, and chloroform inhalation was useful. I may here pay a tribute to the nursing, which was most excellent night and day throughout the critical time.

The incubation period was probably from nine to eleven days until the first local muscular rigidity, which I did not recognize as being due to tetanus until the superadded clonic spasm appeared on September 25th.

A "sore arm" after vaccination in this school is not uncommon by reason of the boys "ragging." This is the first case of tetanus recorded in the school since its institution in 1856.

Malton. Noel C. Forsyth, M.D.

Reviews.

DIFFERENTIAL DIAGNOSIS.

WE welcome the appearance of the second edition of Dr. H. S. FRENCH'S *Index of Differential Diagnosis of Main Symptoms*.[1] The first edition of the valuable book came out in 1912; the new edition is an improvement in many ways on the old, and has been recast on ampler lines, with a large number of illustrations and coloured plates. Every article has been revised and several new ones have been added, and larger type is employed throughout the volume.

The book has been written with the object of supplying medical men and students with a treatise on the application of differential diagnosis to all the main signs and symptoms of disease. It covers the whole ground of medicine, surgery, gynaecology, ophthalmology, dermatology, and neurology. It is an index or dictionary in the sense that it consists of an alphabetical list of signs or symptoms—for example, albuminuria, baldness, convulsions, dysphagia, enlargement of the heart, and so forth, to quote a few of the headings in it. At the same time it is a work on differential diagnosis, in that it discusses the methods of distinguishing between the various diseases in which each individual sign or symptom may be observed. Dr. French appears to have chosen both his two-and-twenty collaborators in the writing of the *Index* and the headings of the articles they should write with equal skill and success. Having read most—we will not say all of the articles in the book, for fear we should not be believed—we have no hesitation in saying that it is a work that should be in the hands of all medical practitioners and senior medical students. Variety in authorship is a great asset to medical dictionaries of this type, for it provides the differences in style and in point of view that do so much to lighten the reader's labour when he comes to consult their pages. Dr. French has succeeded in imparting this variety to his *Index* very happily. Particular mention should be made of the very full and admirably printed general index, with some 50,000 entries, which occupies the last 135 pages of the book. The reader is encouraged to refer freely to this general index when reading the volume, so that he may be able to turn to all the places in which is discussed the disease with which he is dealing. This is very sound advice; for while each sign or symptom is discussed but once in the volume, it is clear that each disease is likely to come up for general description under the heading of each of its more important symptoms. The publisher is to be congratulated upon the printing of the book and its illustrations, and, perhaps most of all, upon the excellence of the many coloured plates it contains. They could not be better, and do great credit to British colour printing.

URINARY ANALYSIS.

THE third edition of Dr. HEITZMANN'S book[2] on the examination of the urine preserves the characteristics of the second edition; the volume is meant for the clinician rather than the man of science, for the test-room rather than the laboratory. The author lays great stress on the microscopical examination of urinary cells and sediments, and upon the diagnostic indications afforded by these; he claims to be able to identify the epithelia derived from each separate tract traversed by the urine, from Bowman's capsule to the meatus urinarius, in the great majority of cases, and appears to argue that if epithelial cells from a certain tract are present in the urine, then that tract is the seat of disease. Dr. Heitzmann goes even further than this, and asserts that urinary "pus-corpuscles, when present in moderate or large numbers, will invariably allow us to form an opinion as to the constitution of the patient. All pus-corpuscles are granular, the nature of this granulation varying with the constitution of the individual." He classes constitutions in four groups, as excellent, good, medium, and poor; the coarser the granulation of the pus cells, the better the patient's constitution. He does not appear to connect this granularity with the reaction or osmotic pressure of the urine in any way. Dr. Heitzmann also describes and figures ciliated pus cells; these, he says, justify the diagnosis of endometritis. He gives no account of the use of the polarimeter in the quantitative estimation of sugar in diabetic urine, and offers an erroneous explanation of the nubecula that appears in normal urines on cooling. The illustrations, highly diagrammatic in execution, are mainly by the author's own hand and from specimens in his possession; he emphasizes the importance of using high magnifying powers—400 or 500 diameters—in the microscopic examination of urinary sediments. The book is an honest if uninstructed piece of work, and may be of service to medical men of discretion.

[1] *An Index of Differential Diagnosis of Main Symptoms.* By Various Writers. Edited by Herbert French, M.A., M.D.Oxon., F.R.C.P.Lond. Second edition. Bristol: John Wright and Sons, Limited. 1917. (Sup. roy. 8vo, pp. 20 + 912; over 300 figures in text; 37 coloured plates. 42s. net.)

[2] *Urinary Analysis and Diagnosis by Microscopical and Chemical Examination.* By L. Heitzmann, M.D.New York. Third, revised, and enlarged edition. London: Baillière, Tindall, and Cox. 1915. (Roy. 8vo, pp. 364; 131 plates. 15s. net.)

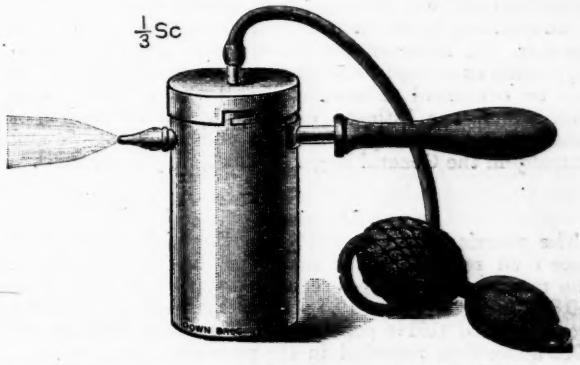
MEDICAL AND SURGICAL APPLIANCES.

Paraffin Treatment of Burns.

THE paraffin treatment of burns was introduced by Dr. Barthe de Sandfort (BRITISH MEDICAL JOURNAL, July 29th, 1916, p. 153), who used a proprietary article to which the name "ambrine" was given. This is, we understand, used in the Navy; but, judging from the paper by Lieutenant-Colonel A. J. Hull, F.R.C.S., R.A.M.C., the formula he recommends gives as good results. It is as follows:

Beta naphthol	0.25 per cent.
Eucalyptus	2.0 ,,
Olive oil	5.0 ,,
Hard paraffin	25.0 ,,
Soft paraffin	67.75 ,,

Colonel Hull recommended that it should be applied with a broad camel-hair brush sterilized in wax. Dr. Barthe de Sandfort prefers to put it on with a spray, and this practice is, we believe, followed in the Navy for the first coat at least. In using a spray the paraffin must be at a temperature of about 50° C. (122° F.). We are indebted to



the Director-General R.N. for particulars of the spray used. The barrel is made of solid drawn brass tube 2 inches in diameter and 4 inches long. A brass stiffening ring is fixed inside the barrel to form a seating for the cover. The cover is fixed so as to be readily made air-tight, either by a bayonet catch, as shown in the illustration, or by a coarse screw. The height over all is 4½ inches. A wooden handle is fixed 3 inches from the bottom. The nozzle is made to screw off for easy cleaning. A capillary tube leads from the nozzle to the bottom of the barrel; it is well curved, and allows a cleaning wire to be easily passed through. The necessary air pressure is obtained by an indiarubber spray bellows of suitable size. The apparatus is made for the Navy by Messrs. Down Bros., St. Thomas's Street, S.E., to whom we are indebted for the illustration. We are informed that if the paraffin is introduced into the barrel at a temperature considerably above its melting point it will remain fluid long enough for the application, but it can easily be melted again by plunging the apparatus into water a little below the boiling point. (See also p. 540.)

Messrs. John Bell and Croyden, Ltd. (Wigmore Street, W.) inform us that they are making a paraffin application for this purpose, consisting of two parts of paraffin, with the addition in the ordinary preparation of kaolin and oil of wintergreen. To this preparation they apply the name of Parakao. They are also making, at Colonel Hurry Fenwick's suggestion, similar preparations, one containing sulphur and the other dilute nitrate of mercury of the same strength as the dilute nitrate of mercury ointment (*B.P.*) which has been found useful in the treatment of eczema and scabies.

THE REGISTRAR-GENERAL'S ANNUAL REPORT.

THE vital statistics of England and Wales for the year 1915 are analysed in the 78th Annual Report of the Registrar-General (Cd. 8484, price 5s.), which has just been published. Some reduction in the tabulation of marriage statistics and in the classification of secondary causes of death has been effected in the present report, but generally speaking all the new features introduced into the 1911 report—in which statistics were for the first time given in respect of each urban and rural district in the country—have been maintained. Following the practice adopted in recent years some subjects have been selected for special notice; these include deaths on which inquests have been held, and deaths in which the cause was not certified by a registered practitioner or by a coroner. Summary tables relating to infant mortality in the quinquennium have also been inserted, and attention is drawn to the fact that, owing to the extensive movement of population due to the war, new methods of estimating population had to be devised. The method finally adopted is explained on page ix of the report; it is based on the returns furnished by local authorities in accordance with the National Registration Act, and the estimates for the several districts are, therefore, necessarily restricted to the civil population, the death-rates throughout the report referring to deaths of civilians only. In calculating birth-rates, however, the total population has to be taken into account, and in view of the impossibility of framing reliable estimates for the current year, these rates are based on the existing estimates for 1914, though local conditions will have seriously invalidated those estimates in some districts.

An interesting innovation in the work of the department, made at the request of the Local Government Board, is alluded to in the report. It consists in furnishing local mortality statistics for 1916 to the various sanitary authorities, and was undertaken with the immediate object of economizing labour in the local sanitary offices during the war. If, however—as there seems little reason to doubt—the experiment should prove successful, the system may be continued permanently, and the duplication of work which has hitherto existed, in the tabulation of causes of death locally by medical officers of health and centrally in the General Register Office, may be avoided.

Marriages.

The marriage-rate in 1915 was the highest recorded since civil registration of marriages has been in force. The number of marriages registered during the year was 360,885, being equal to 19.5 persons married per 1,000 of the estimated (1914) population. This rate was 3.6 per 1,000 above that recorded in the preceding year, and was 4.0 per 1,000 above the average for the ten years 1901–10. Since 1838 the rates have ranged from a maximum of 17.9 per 1,000 in 1853 to a minimum of 14.2 per 1,000 in 1886, the mean rate for the whole period 1838–1915 being 15.9 per 1,000. The extraordinary rise in the marriage-rate, due of course to the war, was very unequally divided over the four quarters of the year; thus in the first quarter the rate was only 0.7 per 1,000 in excess of the quinquennial average, while in the later quarters the excess was 5.3, 4.4, and 5.8 per 1,000 respectively. The mean age at marriage (omitting re-marriages of widowers and widows, for which the details have not been worked out) continues to rise, being the highest on record, namely, 27.33 years for bachelors and 25.47 years for spinsters in 1915, against 26.30 and 24.54 respectively in 1896. A calculation has also been made showing a curious change in the seasonal distribution of marriages in recent years. Thus in the 40 years ending 1880 more marriages were celebrated in the six winter months, October to March, while in the 35 years ending 1915 the greater proportion were celebrated in the six months April to September; the proportion of marriages in the March quarter has fallen by about 20 per cent., while that in the September quarter has risen by about the same amount.

Births.

The birth-rate was the lowest on record, being 22.0 per 1,000 of the total (1914) population. This rate is 1.8 per 1,000 below that recorded in 1914, and 5.2 below the average for the ten years 1901–10; the maximum birth-rate occurred in 1876, when it was 36.3 per 1,000, and since that date there has been an almost uninterrupted decline. The fall in 1915, however, was greater than that recorded in any other single year, but it compares favourably with that which the figures for the principal cities indicate as having occurred in Germany, Austria, and France. Taking the main geographical divisions of this country, the rates for 1915 show that, as in previous years, the greatest proportional fertility is found in Wales; the Northern Counties are next in order, followed by the Midlands, the Southern Counties showing the lowest rate (20.0), which would be lower still but for the inclusion of London, where the rate (22.6) was above the average for the whole country. Of the 814,614 births registered during the year, 415,205 were males and 399,409 females, the ratio of male to female births being 1,040 to 1,000; this is precisely the average for the whole period 1838–1915. In connexion with statements that have been made to the effect that war-time conditions increase the ratio of male to female births, it is observed that in the first quarter of the year the ratio was very low—namely, 1,032; in the second quarter it rose to 1,043, and in the third and fourth quarters to 1,044; moreover, the figures for 1916 which are now available show that for the four quarters of that year the ratios were 1,050, 1,051, 1,045, and 1,050 respectively. Of the total births in 1915, 36.245 were illegitimate; this number is equal to 7.4 per 1,000 of the estimated number of unmarried and widowed women aged 15–45 years, and shows a fall of 48.6 per cent. from the proportion recorded in 1876–1880. It is the lowest rate (calculated on this basis) yet recorded, but owing to the fact that the legitimate birth-rate has shown a greater decline the proportion of illegitimate to total births is the highest since 1889.

Deaths.

The deaths registered in 1915 numbered 562,253, and included 292,381 deaths of males (of whom 8,777 were non-civilians), and 269,872 deaths of females. The civilian deaths corresponded to a rate of 15.7 per 1,000 of the estimated civil population. Corrected for sex and age deviation of this civil population from the standard population of 1901, the rate is reduced to 14.6 per 1,000. The extent of this reduction is, of course, due to the withdrawal from the civil population of males at an age when mortality is below the average, and the standardized rate for the *civil* population would therefore be comparable with the standardized rates for the total population in other years if the males withdrawn from the civil population were subject to the same rates of mortality as the males of the same ages remaining in civil life. It must be assumed, however, that the withdrawals represent selected lives; consequently standardization for sex and age only cannot correct fully for the effect of such withdrawals, and some part of the excess of the standardized rate for the civil population in 1915 over the standardized rates for the total population in other recent years may be ascribed to this factor.

The rate of infant mortality, measured by the proportion of deaths under one year of age to registered births, was 110 per 1,000; this rate is 5 per 1,000 below the average for the ten preceding years, but is 15 per 1,000 above the minimum rate, which was recorded in 1912. For males the rate was 123 per 1,000 and for females only 96 per 1,000; the mortality among illegitimate infants is almost twice as great as among legitimate.

The principal causes of death contributing to the general excess of mortality in 1915 over that recorded in 1914 were the tuberculous diseases and diseases of the respiratory and circulatory systems. Cancer showed a higher mortality as measured by the crude rates; the influenzal mortality was the highest since 1900, and that from measles the highest since 1896. Other special features were the abnormally high death-rate from cerebro-spinal fever and the remarkable decrease of male suicides. Two tables appearing in the present report analyse by cause and age the 39,128 deaths on which inquests were held, and the 7,684 cases in which the cause of death was not certified either by a coroner or by a registered practitioner. Inquiries respecting ill-defined causes of death were sent in 6,869 cases, and in spite of the special difficulties created by the war nearly 6,000 replies were received.

THE CALLING UP NOTICE.

RESOLUTION OF JOINT MEETING OF THE CENTRAL MEDICAL WAR COMMITTEE AND COMMITTEE OF REFERENCE.

THE publication in the newspapers of Saturday last of Lord Derby's letter to medical men of military age, informing them that the War Cabinet had decided to call them up at once under the Military Service Acts, was the first intimation to the profession that the War Office intended to cease to rely on the machinery which had been working with remarkable efficiency for the last two years, and, since the second Military Service Act (May, 1916), with the recognition of Parliament. The policy hitherto approved by the Government has been guided by the sound principle that it is necessary to estimate and balance the medical needs of the army and those of the civilian population, including such essential occupations as munition making, shipbuilding, and agriculture. The duty of adjusting the balance was in Scotland placed upon the Scottish War Emergency Committee, and in England and Wales on two Committees—the Central Medical War Committee representative of the British Medical Association and medical teaching institutions acting for the profession generally, and the Committee of Reference of the Royal Colleges for the staffs of hospitals in London and other large towns. The Committees addressed themselves diligently to this task, and their success is proved by the fact that to their efforts it is due that the military services have been supplied with the larger part of the many civilian medical men, probably not far short of ten thousand, who are now serving, while at the same time the essential medical service for the civilian working population has been maintained in a condition of efficiency which, if it falls short of ideals, is not seriously inadequate.

The publication, on April 21st, of the letter of the Secretary of State for War, and the action of the Recruiting Department, then already taken, which it purported to explain and justify, brought about a situation which urgently demanded investigation. A special joint meeting of the Central Medical War Committee and of the Committee of Reference was held on Tuesday, April 24th. It was very fully attended by members of both Committees, and the following resolution was unanimously adopted, on the motion of Sir Watson Cheyne, President of the Royal College of Surgeons of England, seconded by Mr. E. B. Turner, Chairman of Representative Meetings of the British Medical Association:

> That the Central Medical War Committee and the Committee of Reference cannot continue to bear the responsibility in the eyes of the medical profession and of the community for protecting the medical needs of the civil community while meeting the requirements of the army, unless they still have the duty of deciding how many doctors and which individuals can, in fact, be spared at any given time from civil work in a particular place to enter military service, and that, therefore, unless the War Office will undertake not to grant any commission to a doctor, even though volunteering for service, whom the Committees consider to be for the time being indispensable for civil work, the Committees will be unable to take any further part in the selection of doctors for military service.

The joint meeting decided, also by unanimity, at once to send copies of this resolution to the War Cabinet, the Secretary of State for War, and the Director-General of Army Medical Services. The letter addressed to the Secretary of State for War was in the following terms:

Central Medical War Committee,
April 25th, 1917.

My Lord,

We are instructed to forward for your information a copy of a resolution carried yesterday at a Special Joint Meeting of the Central Medical War Committee and the Committee of Reference, which has been forwarded to the War Cabinet, together with a Memorandum by the Central Medical War Committee, which has also been sent to the War Cabinet.

We are,
Your Lordship's most obedient Servants,
N. BISHOP HARMAN,
A. COX,
Secretaries.

The Right Hon. the Earl of Derby, K.G.,
War Office, S.W.

MEMORANDUM BY THE CENTRAL MEDICAL WAR COMMITTEE.

I.

[The resolution printed above is set out.]

In order to make the position plain the Central Medical War Committee conceives it to be its duty to the civil community to place on record a statement of the reasons which lead the Committee, in virtue of its special knowledge gained from the work it has done, statutory and otherwise, for the Government, to the conclusion that, unless special precautionary measures are adopted, the immediate calling up of all doctors under 41 for military service effected by the War Office must inflict grave injury on the civil community in many parts of the country, particularly in the industrial areas upon which so much depends, both as to the production of war material and otherwise, for the carrying on of the war.

II.

It is obvious that, in order to avoid a breakdown in a locality, it is essential that before any doctor at present engaged in civil work is actually withdrawn from his duties, the question as to whether he can at the time safely be spared from civil work shall have been properly investigated, to the extent required by the nature of the case, either by the Central Medical War Committee, or by some other body acting on behalf of the Government possessed of the knowledge requisite for gauging the needs of the locality.

III.

Hitherto the Central Medical War Committee, aided by its local committees in all parts of the country, and in co-operation with the Government departments concerned, has performed this duty for the Government, watching continuously the varying conditions of the medical services in each locality, and determining from time to time, in the light of those conditions, how many and which doctors could be spared at any particular moment.

IV.

The Notice issued by the Recruiting Department on Wednesday, April 18th, calling up all the doctors under 41 for immediate departure on service on April 26th threw the Committee's machinery entirely out of action, and, although it would seem from certain phrases in Lord Derby's letter published subsequently that some revival of the former arrangements with this Committee is contemplated, it is clear that nothing short of a Government decision to maintain the complete continuance of the requisite scrutiny will suffice to avert grave danger.

V.

The following places may be mentioned as illustrating the dangers which in the absence of such scrutiny must inevitably arise in many areas:

Town A: Chemicals and munitions. Population over 20,000. Number of doctors 4, all of military age.
Town and District B: Ship-building. Population over 60,000. Number of doctors 10, 7 of military age.
District C: Coalmining. Population over 37,000. Number of doctors 7, 6 of military age.
District D: Agricultural area. Population (of town alone) 3,628. Two doctors, both of military age.
Town E: Population over 20,000. Number of doctors 4, 3 of whom are of military age.
Town District F: East-end industrial area. Population about 126,000. Number of doctors 25, of whom 4 are of military age. There is at present only one doctor to over 5,000 people.

VI.

It is clear that from none of these areas could all the doctors liable under the Military Service Acts be withdrawn simultaneously without complete breakdown. But under the arrangements so far made in connexion with the immediate calling up of the doctors there is nothing to secure that these men will not in fact be withdrawn.

VII.

Doubtless the War Office, if aware of the facts, would not propose to take all the doctors from the town A and leave a population of about 17,000 in a munition area entirely without any medical practitioners to look after them. But the War Office is not in possession of the knowledge requisite for avoiding the mistake, nor is it possible for any general or mathematical rules to be formulated for such purpose. The necessary safeguards can only be applied by a body which is continuously surveying the needs and the comparative conditions of the various localities.

VIII.

It is clear, therefore, that if the situation above indicated is to be avoided, as the Government must obviously desire to secure, it must be definitely provided that no doctor, even if himself offering no objection to going, shall be withdrawn by the War Office from the work of the civil community until the competent body authorized by the Government has ascertained and reported that his departure will not cause a breakdown.

April 25th, 1917.

REPLY OF THE SECRETARY OF STATE FOR WAR.

The following reply has been received from the Secretary of State for War:

Gentlemen,

I am in receipt of your letter of April 25th, and in answer to it I beg to state that I agree that the procedure prevailing up to last week with regard to the selection of doctors shall be continued, and I will further agree not to give a commission to any doctor except on the recommendation of your Committee.

Your Committee is asked to provide the Army with * doctors by May 1st, and *. doctors per week after that date until the requisite number * has been found. In the event of the number so asked for not being forthcoming, I must reserve to myself the right at any time to reconsider the position.

I trust that this arrangement will be agreeable to your Committee, and that they will continue doing the excellent work for the War Office that they have done in the past.

Yours faithfully,

25th April, 1917. (Signed) Derby.

* The figures given in this letter are left blank for obvious reasons.

The text of Lord Derby's letter, together with the instructions issued by the Army Recruiting Department are printed in the Supplement. Answers in the House of Commons will be found at p. 556. A very large number of letters of inquiry have been received to which it has not been possible, in spite of working early and late, to reply individually. It is believed that the matter here published will in most instances supply the information required.

British Medical Journal.

SATURDAY, APRIL 28th, 1917.

THE BIOCHEMISTRY OF MUSCULAR CONTRACTION.

The publication of the Croonian Lecture[1] given before the Royal Society in 1915, by Dr. W. M. Fletcher and Professor F. G. Hopkins, has for various reasons been delayed until the other day, so that we have not previously had an opportunity of referring to it. It dealt with the respiratory process in muscle and the nature of muscular motion, and thus piously fulfilled the directions of Dr. William Croone (1633–1684) that it should be delivered "on the nature and laws of muscular movement." With the lapse of years it often becomes difficult to conform to the injunctions of an ancient benefactor, and as a matter of fact the last sixteen Croonian lectures have, strictly speaking, disobeyed the terms of the endowment. Croone was one of the founders and original Fellows of the Royal Society, and as the author of *De Ratione Motus Musculorum*, published at London in 1664, is appropriately commemorated by the Croonian lecture of 1915, which gathers into a connected whole the advances since the end of the nineteenth century.

Study of the respiratory changes in muscle is the most probable means of throwing light on the metabolism of the animal cell in general, and the interest of this discussion is therefore fundamental. The researches described have been carried out in the physiological laboratory at Cambridge by various workers, but especially by Dr. W. M. Fletcher and Mr. A. V. Hill; the latter by ingenious modifications of the thermopile and by a sensitive galvanometer has been able to record the changes of temperature associated with a single muscular contraction.

Until now the orthodox conception of the origin of muscular energy has been the explosive splitting up of a molecular complex rendered highly irritable by the inclusion of "intramolecular oxygen"—Hermann's hypothetical "inogen"—into lactic acid and carbon dioxide. After the explosion of this precursor it was supposed that fresh carbon bodies, and perhaps lactic acid also, were combined again in a newly oxygenated irritable molecule of "inogen." This hypothesis was extended to cellular metabolism in general, which was regarded as an alternating process of construction (anabolism) of unstable complexes of oxygen-containing protoplasm succeeded by a catabolic discharge of energy with the formation of recognizable end-products. An entirely new conception is foreshadowed in the Croonian lecture on the basis of the recent researches on muscle.

It is impossible to give here any detailed account of so closely reasoned a document, or of the researches on which it is founded, but the outcome may be baldly stated. The oxidations which are always associated with muscular activity are separated in time from the moment when mechanical energy is liberated; they occur immediately afterwards, and are concerned not with the induction of the contraction, but with a restoration to the *status quo ante*. For example, the greatest production of heat is always subsequent to the contraction, when oxygen is available. Oxygen enters muscle for the purpose of immediate oxidation, and

[1] *Proc. Roy. Soc.*, B, vol. lxxxix, 1917, pp. 444–467.

not as a builder-up of an explosive "inogen," and contraction is an anaërobic function. The conception of a chemical "inogen" is erroneous, and a simpler explanation should be substituted — namely, that a carbohydrate body in muscle by relatively simple change gives rise to the formation of lactic acid, which before it leaves the muscle in its final combustion induces tension changes causing contraction.

We are accustomed to speak of an apparatus for the production of energy as an engine, and are therefore entitled to speak of muscle as an engine. The word suggests at once to most people a heat engine—the steam engine, for instance—and the suspicion must arise that this analogy somehow will not do. In a heat engine, such as the steam engine, only a part of the "total energy," known as the "free energy," is converted into work; the conversion depends on the temperature difference between one part of the engine (the furnace) and another (the condenser). Heat passes from one to the other through interposed apparatus in such a way as to convert some of it into work; the rest of the total energy escapes as heat and is wasted. Efficiency is the ratio of work obtained to the total heat energy used up; this is generally far below 20 per cent.—that is to say, 80 per cent. escapes as lost heat. Evidently muscle cannot be a heat engine because, in the first place, the necessary temperature differences cannot be supposed to be compatible with cell life; because, in the second place, muscle efficiency is very high—apparently higher than that of the best types of heat engine; and in the third place because heat evolution in muscle is for at least its larger part separable in time from the work done in contraction; the chief heat evolution is after the contraction, when oxygen is present. With oxygen absent there is a very small heat evolution on contraction, which is an anaërobic act. With oxygen thereafter introduced a large heat production occurs without contraction. The authors argue, therefore, that muscle is to be regarded "as a chemical instead of as a heat engine." Free energy residing in chemical compounds, and available upon their undergoing change, may be converted to work directly, without the interposition of a heat stage, as in the case of the chemical battery—current—electromotor. The efficiency of such an engine may be 100 per cent.

The events in muscle occur in material held in solution, and under this condition free chemical energy can be displayed in work either through osmotic energy (imbibition being here held to be a variety of osmosis) or through surface energy. If sugar yields lactic acid, then the acid might be in cylindrical spaces to which a flow of water would be determined by the increased osmotic energy, and cause, by expansion of each cylinder to a sphere, a longitudinal tension capable of doing work; or (*b*) the acid, or its H-ions, by increasing the surface charge and surface energy of a row of connected globules might force each to a more strictly spherical shape, the result of this alteration in form being that work was done. The time-relations of muscle contraction point to a surface energy change rather than to an osmotic energy change working through diffusion of water, which would be relatively slow. The quickness of surface changes is well seen in the movement of the mercury column in a capillary electrometer. The authors put the matter thus, to quote their own words: "In a system of colloidal fibrils or of longitudinal surfaces, into relation with which H-ions of lactic acid lie ready to be brought, we have a potential of energy which may be discharged as work, with or without heat, on the development of a new state of tension in the fibrils, whether tension due to imbibition or to added surface tension along the longitudinal surfaces." The potential is lost after contraction and restored by subsequent oxidation. If lactic acid accumulates in the muscle, fatigue results from clogging of the machine; but with a sufficient supply of oxygen the lactic acid is oxidized with the production of CO_2, some of the heat of the combustion of lactic acid being stored in potential form in the muscle as it returns to the resting state, with the result that a normal contraction may follow.

In conclusion, therefore, a simple hypothesis for muscular contraction is fully justified, and this step in advance gives promise of a similar clarity in our conception of general cell metabolism.

THE FOOD ECONOMY CAMPAIGN.

THE shortage of food is due partly to the depredations of the German submarines and partly to a poor wheat crop throughout the world, and a poor potato crop in this country. The situation is so grave that it becomes a duty to call attention to any errors which are to be observed in dealing with it, whether due to want of judgement or want of knowledge. We therefore feel bound to say that some of the means which are being used by the Food Controller are open to criticism. A short time ago we noticed with regret a passage in a speech by Lord Devonport which was greeted with laughter in the House of Lords, but must have made the judicious grieve. He spoke of "his experts, who talked in terms of averages and used all sorts of curious expressions, which he was careful not to understand." Such a contemptuous reference to scientific methods by a responsible minister on an important occasion is calculated to bring this country into contempt not only with our enemies, but with our allies the French, and our friends the Americans, whose administrators take the very small amount of trouble necessary to understand the expressions and terms our Food Controller finds "curious." The recent pamphlet issued by the Ministry of Food with the title *The Food Economy Campaign Handbook* affords an illustration of the evil results of neglect of scientific methods in high places. Experience has often proved how relatively easy it is to conjure a man's savings out of his pocket by a mixture of the arts of the company promoter and sensation monger, and it becomes easier when the conjuring is based on an appeal to a sense of patriotic duty. But it is another thing by such appeals to seek to induce a man to give up that daily ration of food which suffices to keep going his body warmth and vital energy, the two great bases of existence. Moreover, there is some cause to fear that the hustling manner in which the campaign now in progress is being conducted may have a most injurious effect upon growing children and adolescents. Take, for instance, the case of the inmates of institutions who are not free to satisfy the cravings of the appetite, and cannot protect themselves by supplementing their stated diet. As an instance in point, we may mention the case of a spare, growing girl of 17, keen in work and play, who, at a private school last term, lost, owing to injudicious rationing, 10 lb. in weight, which she could ill afford. She returned home in a depressed state of health and with a report which stated that she had inexplicably fallen off in interest in her work in the last half of term. At this school the bread was rationed, irrespective of individual needs, to eight half-slices a day, and there were instituted two meatless days, on one of

which a thin soup served with sippets of toast and a helping of rice or tapioca pudding formed the meal. No bread was allowed at dinner. Physiological inquiry has proved that it is children in the growth period who want meat with its readily assimilable proteins needed for body building, and yet the Food Controller, while urging his ration, which yields only half the calories required by a girl of 17 and a third of those needed by a hard worker, upon schools and institutions, permits the far ampler allowance of 5¼ lb. a week to the frequenters of hotels and restaurants, in addition to 3½ lb. of bread, 14 oz. of flour, and ½ lb. of sugar. Is the old and sedentary clubman, who is better for abstinence, to have more than the restless, growing child, and the virility of the future generation to be impoverished?

While very properly urging saving and economy, the *Handbook* contains misstatements and exaggerations of such a kind that they bring discredit upon the Ministry of Food. For example, the *Handbook* states that "half-chewed food gives half its nourishment. . . . Eat slowly, you will eat half as much as you eat now, grow healthier and stronger on it, double your power of work." These are statements unsupported by an atom of scientific evidence. The physiology of dietetics and metabolism has become in its main principles as exact a science as that which governs the utilization of the energy of fuel in combustion engines, and yet the draft of this *Handbook* was not submitted to the criticism of the Food Committee of the Royal Society, but left to amateurs and food cranks to prepare. Can the shade of Dickens keep quiet? Is the Bumble of the day to say, "Oliver, chew the slice slowly, and you won't want another, and meanwhile read what the kind Food Controller says"? The poor little imp cannot run out to the shop and fill the empty pail as Bumble can. Again, the *Handbook* says: "Before the war the nation could have lived on its waste. It could have lived on what went into its dustbins and down its drains. That waste goes on." Now the report of the Food Committee of the Royal Society, based on the figures supplied by the Board of Trade, shows that the quantities of foodstuffs, imported and home produced, sufficed to give each individual of the population 3,091 calories a day, or the "man" population 4,009 calories. The hard-working labourer requires at least 4,000 calories, and we may take the average "man" requirement as 3,500 calories. The quantities include the inevitable loss due to bone (even after stewing for soup), the husks of vegetable food, and food which is lost in handling, marketing, in hot weather, and so on. Either, then, there was little waste before the war or many went half starved.

As useful cats, dogs, poultry, and pigs are fed largely on the leavings of human food, the waste of food on them must be small. The waste of servants, intensely realized, as seems probable, by the writers of the *Handbook*, is chiefly a waste of their employer's money, not of food. Servants probably give away more food, which is utilized by others, than they waste. The number of people estimated before the war by the British Association to pay income tax—that is, the number of those earning over £160 per annum—was 800,000. Suppose these, together with those living on unearned incomes and their families, number in all 3 million, an outside estimate, their possible saving of bread can have only a very small influence on the needs of the 40 million of the working population who cannot afford to purchase, or do not know how to use, substitutes; at the outside, the saving of the 3 million might yield 5 per cent. of the calorie needs of the 40 million.

It is obvious, then, that the present very critical situation cannot be met by a campaign of saving and economy alone. Captain Bathurst has stated that the present rate of consumption of bread-stuffs is 50 per cent. more than the supply which is in sight for the months between now and the harvest. This being the case, the Government will be impelled to take the grain stuffs—barley, maize, and oats—consumed by all horses not doing work of national importance, of cattle, and of poultry, and use this grain for diluting wheat and making bread for human consumption. At the same time, it must reduce the herds and cheapen meat, and so substitute meat and fat for part of the bread now eaten. If this does not suffice, grain must be regarded as a munition of war of first importance, and be shipped in sufficient quantity even at the expense of other munitions. For the bread eaten by the workers is the source of their energy, and cannot be reduced in any significant amount by any method which will not also reduce their working power.

If the energy of the workers is seriously reduced the war must cease. No amount of saving of waste and of economy, even to the extent of underfeeding the sedentary class, can make any material approach to the 50 per cent. beyond the visible supplies which Captain Bathurst tells us is being consumed.

In the *Handbook* there is no attempt to insist on the complete national utilization of the energy value of the food. The well-to-do are not told to diminish the number of their domestic servants, who do things that need not be done in war time, or to give up luxuries which employ needless labour. On the contrary, the rich man who dines on lobster salad is called a patriot! And yet labour goes to the procuring of this dish which might be spent in growing foodstuffs which would yield a value a thousandfold greater. The greatest economy which the "useless mouths" can effect—those who cannot do work of national importance—is to keep warm and at rest, and so lessen their bodily need of food. A man cannot be active and at the same time go short of food without losing weight, then working power, and, in the end, health.

The nation is working far harder than before the war, the women and girls who used to lead sedentary lives are now engaged in active labour. The national need for more food has increased in exact proportion to the extra physical labour done. The supply of potatoes has gone, meat and butter and grain substitutes are dear, therefore an increased and not diminished consumption of bread by workers must inevitably arise at this time. This increase can be met in the first place by national control and cheapening of meat and fat with reduction of herds, and substitution of meat and fat for some of the bread now eaten. In the second place, the dilution of wheat with the grain foods now consumed by horses, cattle, and poultry would, we are informed, increase the bread supply by some 25 per cent. The third means is to provide for the adequate importation of these grains, even at the expense of munitions of war.

THE NAVAL MEDICAL SERVICE.

WE publish this week the first series of a set of articles by writers of authority, giving an account of the manner in which British medicine has reacted to the stimulus of the new problems in medicine, surgery, pathology, and administration created by the war. This first group of articles deals with the achievements of the medical department of that great silent service upon which the safety of the realm and of the British empire rests.

subsequent articles which will be published at intervals during the next few months will deal with other aspects of the part medicine has played in the war, and will indicate some of the enduring lessons that have been learnt. In his brief introductory note to the collection of naval papers, Sir Arthur May, the Medical Director, R.N., modestly ignores the great part which it is well known he has played in producing the highly satisfactory condition of the department of which he is the head. We are much indebted to him and to the other distinguished officers who have collaborated in the task of furnishing to their colleagues in the army and in civilian practice this first authoritative picture of medicine, surgery, hygiene, and sick transport in the Navy at war. Every one is, of course, profoundly interested in the work of the Navy, but the service moves so quietly and is so much hidden from ordinary view that the tendency is at times to take it somewhat for granted and await details until the history of the war at sea is written. We feel much satisfaction, therefore, in being able to publish this series of articles, which will bring home to our readers in vivid fashion some of the actual conditions under which their colleagues in the Navy work and the special problems they have to solve in order to keep the fighting efficiency of the Navy at the highest pitch. An outbreak of infectious disease in the specialized population of a battleship, or in the general personnel of the Navy, might well have military results of the most serious kind. The article on medicine and pathology, by Fleet Surgeon Bassett-Smith and Surgeon-General Rolleston, an instance of the fruitful combination of regular and temporary officers, shows how successful the Naval Medical Service has been in the prevention and limitation of all forms of epidemic disease. When cerebro-spinal fever seemed to threaten our land and sea forces two years ago, the most vigorous measures were taken to check its spread, so that the number of cases in the Navy during the first year of the war was kept down to 170; in the second year, when the numerical strength was far greater, they fell to 104. The precautions taken in this instance illustrate the zeal with which the latest scientific methods are applied to control the beginnings of infectious disease. The same spirit is reflected in the article on naval surgery by Surgeon-Generals Axford and Lenthal Cheatle, who summarize the patient researches, *in vivo* and *in vitro*, carried out by many workers into the technical problems of wound treatment at sea. The section on naval hygiene by Fleet Surgeon Munday, will, no doubt, be read with special interest, for here, perhaps for the first time during the war, we are given a glimpse of the special difficulties with regard to air space, ventilation, and water supply in fighting ships, and the admirable way in which sanitary improvements have been brought about in the construction of the newest ships and in the refitting of older vessels. The varying means of transport of sick and wounded ashore and afloat are dealt with in separate articles which may well be studied side by side. Sir James Porter and Staff Surgeon Elder's description of the Land Medical Transport arrangements of the Navy show how the machinery for evacuation on shore has been developed during the war. The special difficulty of this branch of the service lies in the fact that arrangements for the disposal of casualties cannot be made beforehand, since before a naval action takes place no one can tell where it will occur, or where or in what numbers the wounded may be landed. Fleet Surgeon Lomas, in his interesting account of the work and equipment of a modern hospital ship, carries the story a stage further back; while Deputy Surgeon-General Hill and Fleet Surgeon Penfold bring vividly before our minds the task of the naval surgeon in action and his contrivances for first aid and disposal of the wounded in anticipation of "The Day." The general impression which one gains from these studies of the manifold activities of the Royal Naval Medical Service is that of keenness, foresight, and resourcefulness—before the war and during the war—from the Director-General right down to the humblest member of the sick berth staff; it is an organism working smoothly and effectively in all its parts.

LIFE ASSURANCE IN WAR TIME.

THE decision of the War Office to establish more hospitals oversea, due to the German attacks on British hospital ships, has already led to a considerable number of medical men undertaking to go abroad to serve these hospitals, and whatever the result of the recent action of the War Office embodied in Lord Derby's letter of April 21st may finally be, it can hardly be doubted that it will involve an additional number of medical men of military age being sent abroad. Many such men who have to consider their position will probably be forced to consider the question of safeguarding or increasing their policies of life assurance. At the moment, however, many life offices are unwilling to cover any risk arising from active war service abroad, so that it is not an easy matter to obtain a suitable policy. We are informed that the Medical Insurance Agency has been able to make arrangements with a well known office under which (1) all risk of foreign service can be assured on payment of an extra premium, or (2) the war risk can be suspended without ultimately invalidating the policy. Under the first plan the war extra becomes payable when the doctor leaves this country; but, if he should never go within ten miles of the firing zone, at least 50 per cent. of the extra is refunded on his return to this country in good health. Under the second plan policies can be issued under certain tables, without extra rate, in which the risk of death is excluded during active service abroad or within six months thereafter. At the expiry of the period of suspension the risk revives without further medical examination or inquiry, and should death occur during the period the premiums paid are returned. Full particulars can be obtained from Mr. Guy Elliston, secretary and agent of the Medical Insurance Agency, 429, Strand, W.C.

CEREBRO-SPINAL FEVER.

A REPORT on bacteriological studies in the pathology and preventive control of cerebro-spinal fever among the forces during 1915 and 1916 has been issued by the Medical Research Committee.[1] In January, 1915, the Committee was consulted by the Director-General A.M.S. with regard to the occurrence of cerebro-spinal fever among the troops at home, and it was recognized that in the state of knowledge at that time it was necessary not only to provide for the immediate application in preventive work of what was then certainly known, but also for organized research work to improve the light by which further administrative action should be guided. Dr. Mervyn Gordon, assistant pathologist to St. Bartholomew's Hospital, who had previously done the chief work in this country on the subject, was selected by the Committee and his services placed at the disposal of the War Office as bacteriologist. He assisted Surgeon-Colonel Reece in arranging for proper bacteriological work at various local centres and in securing its co-operation with that of himself and his colleagues at the central laboratory, Royal Army Medical College. The Committee published in January a report on the work done down to that time, and the new report contains an account of the work done by Lieutenant-Colonel Mervyn Gordon and his colleagues, together with two additional reports, one by Fleet Surgeon Bassett-Smith, C.B., R.N., on the result of the examination of nearly 5,000 men for the presence of the meningococcus, and the other by Dr. Martin Flack (honorary captain, R.A.M.C.), a member of the Committee's scientific staff, who was supplied to the War Office for work in the London Military District, on cerebro-spinal fever in that district.

[1] His Majesty's Stationery Office. 1917. To be obtained from any bookseller. (Price 1s. 6d. net.)

A report by Major T. G. M. Hine, M.D., R.A.M.C., on the work of the department of the central laboratory concerned with the supply of media and other requisites for the bacteriological examination of military cases and contacts, is also published. In his preliminary account of the bacteriological measures adopted for dealing with the outbreak in February, 1915, and the improvements effected as the result of research, Lieutenant-Colonel Gordon explains the general principles underlying the campaign and the special methods whereby the meningococcus was attacked. The healthy carrier was recognized as the chief mode of spread of the malady, and all the measures undertaken kept this factor in the foreground. Much of what was accomplished has already been recorded in our columns, and need not now be taken up again in detail, since the Medical Research Committee expressly state that the present series of reports do not pretend to have scientific finality. In the main they are published as interim reports upon investigations still in progress. At a later stage in the inquiry the Committee hopes to issue a further report, in which the conclusions derived from experimental work and organized observation may lead to a final settlement of the main principles governing future administrative measures, for the civilian no less than for the military population.

THE ANKLE-JERK.

THE ankle-jerk is one of the physical signs that does not receive the attention to which it is entitled. Temporary Surgeon Hildred B. Carlill, neurologist to the Royal Naval Hospital, Haslar, has recently published two papers[1] in which he shows how serviceable this deep reflex may prove in diagnosis. The ankle-jerk is tested in the following manner: The patient kneels upright with both legs on some soft substance, such as the seat of an armchair, with his ankles projecting from it. The examiner squeezes the calf muscles to make sure that they are relaxed; complete relaxation is shown when this action produces extension of the ankle-joint. With one hand the examiner next supports the sole of the foot, pressing it gently forwards. This causes the tendo Achillis to be put on the stretch. The tendon is now smartly struck with a rubber-topped percussion hammer. In health the blow causes an immediate contraction of the calf muscles, with extension of the ankle. This reflex is present normally in all healthy people, and can be obtained without removal of the shoes; in advanced age it may sometimes be difficult to elicit. The muscles concerned in the production of this reflex are the gastrocnemius and the soleus, chiefly the latter. The centripetal path of the impulse which produces it is by way of the sensory fibres of the posterior tibial, internal popliteal, and great sciatic nerves through the last lumbar and upper two sacral nerves to the cord. The centrifugal path from the cord to the muscles concerned is by way of the same nerves. The jerk itself depends on a direct mechanical excitation of the muscles, which are normally maintained in a state of tonus by reflex influences. The ankle-jerks are absent in numerous abnormal conditions or general disorders, such as spinal anaesthesia, narcosis, coma, great fatigue, or pneumonia. They are also absent in cases in which the integrity of the reflex arc (at the level of the third sacral segment) is impaired at any point; in injuries or myopathies affecting the gastrocnemius and soleus muscles, for example; or in affections of the peripheral nerves concerned; or in certain diseases of the spinal cord, meninges, and brain. In the course of an examination of 1,052 officers and men on one of His Majesty's ships, Dr. Carlill found total absence of one or both ankle-jerks in 15 instances only. In 49 of the men "reinforcement" by the methods usually employed when the knee-jerk is being tested was found necessary, and it is noted that occasionally the outer side of the tendo Achillis is more responsive than the inner. Of the 15 abnormal cases 3 were the result of infantile paralysis, 2 of sciatica, and it was thought that early tabes dorsalis accounted for the abnormality in several of the others. It is pointed out that the calf muscles may contract and produce an ankle-jerk when struck in many of the cases in which the tendo Achillis jerk is absent. The general conclusion reached is to the effect that the best known and most commonly tested tendon reflex is still the knee-jerk, "though the Achilles-jerk," to quote Ferrier's words (1906), "is of equal or even greater importance."

[1] *Journal of the Royal Naval Medical Service*, London, 1916 and 1917.

Medical Notes in Parliament.

The Calling up of Medical Men.

IN the House of Commons on April 25th Mr. Pringle asked Mr. Bonar Law whether notice had been served upon all doctors of military age to report themselves for service at 9 a.m. on April 26th; whether the doctors so called up were to be required immediately to accept commissions and to be ready to go on service at forty-eight hours' notice on or after May 6th; whether, in the case of doctors who refused to apply for commissions, the recruiting officer was instructed immediately to enlist them as privates in the R.A.M.C.; whether, in view of these instructions, adequate steps were being taken, and if so what steps, for securing that the essential needs of the civil community were met, in order that a serious breakdown, which must otherwise certainly take place in medical services in many localities, might be averted.

Mr. Bonar Law replied: Notice of a similar question has been addressed by an hon. member for Norfolk to the Under Secretary for War, and I will reply to both. The calling up of these doctors was necessitated by the attacks upon hospital ships, but the danger of the civil population in particular areas being left without doctors is fully realized. Although all the doctors of military age are being formally called up, they will be taken only after consultation which is now taking place with the Local Government Board and the National Insurance Commission.

Mr. Pringle asked for an assurance that where a man was willing to accept a commission, and even where he refused a commission, he would not be taken away without consultation with these authorities.

Mr. Bonar Law: That is the substance of the answer which I have given. The whole subject is being considered.

Sir Walter Essex: Is the Government considering the question of replacing these doctors by others who will be liberated from employ owing to the probable closing of hospitals in this country?

Mr. Bonar Law: The National Insurance Commission and the Local Government Board are fully alive to this, and realize that the problem can be satisfactorily remedied only if men who are older will undertake a portion of the duties hitherto performed by those who have been called up.

Sir J. D. Rees asked whether efforts would be made to include among those medical men who were left behind such doctors as were able to pursue research to public advantage.

Mr. Wedgwood asked Mr. Law to say whether the Minister of Munitions would also be consulted on this question, seeing that doctors were very important in connexion with the manufacture of gas and in steel works in the country.

Mr. Bonar Law: I can assure the House that this whole subject is being thoroughly gone into from the point of view of making the best use of the material available, in the view of the Government, and I am sure it is the view of the House that the wounded must have attention.

Mr. Broughton asked the Under Secretary for War whether, to prevent great difficulties arising by reason of the withdrawal of medical services in any area, Insurance Committees or other authorities responsible for the public health would be allowed a right of appeal against the recent order calling up medical men, similar to that accorded to individuals?

Mr. Macpherson replied: Each individual affected by the Military Service Acts has got his right of appeal, and a doctor can appeal to a tribunal who would refer his

case to the Central Medical War Committee. The procedure as to the action, if any, which an Insurance Committee or other authority may take is now being discussed by the Departments concerned.

The Venereal Diseases Bill.

New Statistics of Progress in Free Treatment.

The second reading of the Venereal Diseases Bill, which has already passed through the Upper House, was moved in the Commons on April 23rd by Mr. Hayes Fisher (Parliamentary Secretary to the Local Government Board). Mr. Fisher recapitulated the arguments for the measure which were advanced by Lord Rhondda in the House of Lords. Its purport he summarized admirably. What the bill does, he said, is to prohibit all persons except qualified medical practitioners from treating venereal disease, or prescribing or advising in connexion with it. The bill makes it illegal to dispense any drug or other preparation as a remedy for venereal disease except on the written prescription of a qualified doctor. It does not apply to the sale of these substances to doctors nor to wholesale supply. It will operate only in areas to which it is applied by order of the Local Government Board, and that Board will have to be satisfied that free centres for the treatment of the disease have been set up before they apply the bill to any area.

Regarding what has already been done to forward free treatment, Mr. Fisher reported progress since Lord Rhondda spoke. Schemes for the diagnosis and treatment of the disease had now been submitted to the Local Government Board by ninety-nine out of 145 councils charged with the execution of these recommendations. The total population of the area of those schemes was 19 millions. Sixty-one schemes—serving a population of over 16 millions—had been approved. Considering the extraordinary difficulties under which hospitals are working with depleted staffs, a great debt of gratitude was due to those hospitals which had, on the whole, very freely come forward to co-operate with the local authorities in the new task.

Questioned as to the extent of actual working of the schemes, Mr. Fisher said that in London alone, in six hospitals out of twenty-two which were dealing with these diseases, 1,195 males had been treated, and 350 females, during the first three months of this year. In the Newcastle district 309 males and 154 females had been treated in the same period.

Anticipating objections to the bill, Mr. Fisher took up in advance the suggestion that the Government was trying to drive out from practice all those who were not qualified medical practitioners. He denied that this was so. The reason they singled out these cases for prohibition was clear. If a man suffered from lung trouble and went to a quack it did not matter to the community. In the case of venereal disease it did matter. There was evidence that infectivity instead of lasting several months could be reduced to several weeks. They had a right to say to a sufferer, You shall not go to someone who will drive the disease into you, but you shall go to somebody who will cure you, and therefore release the community of infectivity. Mr. Fisher acknowledged that the policy must be largely one of persuasion, but he trusted that there would be a State Publicity Department connected with this work, and that it would give, as far as it could, the same information as to what it thought right treatment as the quack had given about his methods.

In the ensuing debate Mr. Joseph King argued against the bill as infringing liberty in treatment.

Captain Frederick Guest expressed a fear that the machinery of the free treatment scheme would be too slow adequately to tackle the disease for the purposes of the war. In his opinion, there were only two ways in which good could be done. The first was to remove temptation from the soldier and the second to subject the civil population to compulsory treatment and detention until cured. It had been stated that the percentage of the disease in the army was 43 per 1,000. Reckoning such an army as we might be imagined to have had last year, Captain Guest said this percentage showed something like 107,000 cases. Those seemed to him very serious figures when we were hunting to get recruits in hundreds. These were the War Office figures, and he did not know whether they covered all the cases that had occurred in France as well as in England. He had certain figures which made him rather suspicious. His own figures were open to challenge. He submitted them for the purpose. During two and a half or two and three-quarter years there had been admitted into the hospitals of England over 70,000 cases of gonorrhœa, over 21,000 cases of syphilis and over 6,000 cases of soft chancre. What the figures were in France we did not know, as they were wisely kept wrapped up. But he did know of a British hospital in France instituted to deal with such cases where accommodation for 500 or 600 had been expanded to accommodate 2,000, and it was continually full. He would be delighted if the Government could inform him that he was wrong in saying that during this war between 40,000 and 50,000 cases had passed through our hospitals in France. Some of these cases reappeared as admissions to England, but he believed not many. Coming to the figures for gonorrhœa, Captain Guest said the figures given him suggested that the number was between 150,000 and 200,000 cases, and that few of them reappeared in England. Passing down to the sectional considerations, Captain Guest said, as to the Canadians, that in one camp during sixteen months there were 7,000 cases. Having pointed out in the army it was a military offence to contract the disease, and that the penalties were serious, Captain Guest pursued his argument that the strongest action should be taken in reference to the civil population. He insisted that there should be compulsion for notification.

Sir William Collins in a brief speech took a non-committal attitude. He regarded the practice of quacks in the case of these diseases as most pernicious and objectionable, but was not certain that the tuberculosis quack was not more shameful, or the cancer quack not worse than either. If unqualified practice was to be put down, to put it down altogether might be better. But medicine was a progressive science, and he preferred to see the practice of scientific medicine and surgery stand on its own merits without illegitimate rivals being suppressed by penalty.

Mr. Given-Jones, speaking for the pharmacists, urged that if the Apothecaries' Act were enforced against unqualified people nine-tenths of the evil which this bill was intended to hit would be removed. He considered that Clause II of the bill was unworkable. The way to deal with this portion of the matter was, he thought, by an amendment dealing with advertisements, but at present the provisions of this bill and of the Criminal Law Amendment Bill overlapped.

Sir J. D. Rees thought this particular bill hardly needed, but, if it were, it must be filled with safeguards, and Mr. Dillon offered the opinion that this bill and the Criminal Law Amendment Bill were rather bad specimens of panic legislation. Sir Hamar Greenwood, on the other hand, supported the bill as an instalment of legislation greatly needed. He spoke with special reference to what Canadians had suffered. Sir George Radford objected to the bill as one not properly thought out. Mr. Boyton welcomed this and the other bill, but made it clear that, though he represented a London constituency in which were many medical men, none had made any direct representation to him on the subject, and he was satisfied it was not their desire to get any close legislation of a trade union character. Mr. D. M. Mason supported the measure. The second reading was carried without division, and the bill was sent to the same Grand Committee as considered the Criminal Law Amendment Bill. It is to meet on May 1st.

The Cost of Artificial Limbs.—Major W. A. Chapple asked the Pensions Minister whether the prevailing price of an artificial limb for soldiers was £15; whether several artificial limbs had sometimes to be made in succession for the same man; whether over 6,000 limbs had already been made, and whether the Minister had taken any steps to ascertain if such limbs could be produced, consistently with the utmost efficiency, for about £5 each if made under the direction of the Ministry of Munitions. Mr. Barnes said that the cost of artificial limbs varied considerably. It was the case that occasionally the first limb supplied proved unsatisfactory and had to be replaced, and also that over 6,000 limbs had been supplied since the beginning of the war. It might be possible to reduce the price (though whether by so much as was suggested he had no means of judging) by undertaking wholesale manufacture, but the stage for that had not been reached. Improvements were being effected daily in the various types of limbs required, and it would not be expedient to standardize them at present.

DR. JAMES LITTLE, Regius Professor of Physic in the University of Dublin, left £68,500.

THE WAR.

MEDICAL WORK IN THE ARRAS ADVANCE.

THE series of actions known—for the present, at any rate—as the Battle of Arras, and involving the neighbourhood of Vimy Ridge, a point of very great strategical importance, have put a severe strain upon the forward medical organization. This has been due in part to the very bad weather, which has made wheeled transport in some districts practically impossible and hand carrying very difficult, in part to the length of the line involved in the operations—about twenty-eight miles in all—and in part to the difficulty of getting the casualty clearing stations as close to the actual front as is now deemed desirable. This last difficulty was due to two causes—the very hilly nature of the ground, and the fact that the area is not traversed by railways, though it is skirted by railways on the north and south. The difficulty was met by arranging a large number of main dressing stations at moderate distances from the casualty clearing stations and evacuating the casualties from them, some along the southern and some along the northern railway. The state of the roads rendered rapid transport impossible. Most of the roads which had to be used were the country lanes of a hilly country branching off from sections of old Roman roads or national highways, but their surfaces had been broken up by previous traffic, and what between mud and snow and other obstructing conditions, distances that could have been traversed easily by a motor ambulance in forty minutes often took twice as long. In the interspace between the main dressing stations and the advanced dressing stations the conditions of the roads were much the same in some places, but usually very much worse.

Here the old horse ambulance had an opportunity of proving its usefulness when roads are thoroughly bad. On a fairly high-cambered road, say a crown of 6 in. and a rut 9 in. deep on either side, the automobile ambulance is very apt sooner or later to find itself balanced on its differential casing, and its back wheels whizzing round uselessly. A horse ambulance has at least twice as much clearance, and even if the back wheels sink up to the back axle at some particularly bad bit in the road, the horses, if strong enough, can still drag it through. With an automobile carriage, power of progression stops the instant the back wheels cease to grip the ground, and this must always happen if the differential casing impinges on the road surface. The wisdom of retaining a certain number of horsed ambulances was therefore again evidenced. From the trenches to the advanced dressing stations transport was at some places possible by tramway lines, but where these were not available, and beyond the point where they ended, casualties had to be carried through a sea of mud and a wilderness of broken wire and deep trenches. It is a marvel how the work was done when it is remembered that the advance everywhere covered upwards of a mile in depth and in several places many miles, and that over all these miles of deep and sticky mud stretcher-bearers had to carry their burdens. To carry a man weighing some ten or twelve stone over roads a foot deep in mud is an exhausting task, and to carry him over morasses such as those formed by the belt of the original British and German front line trenches one would be inclined to say was impossible had it not been done many thousands of times on Easter Monday, Tuesday, and Wednesday alone. The personnel of the R.A.M.C. at the actual front ought to be composed of the strongest kind of men, as stretcher lifting and carrying is, under any circumstances, tiring work, and stretcher carrying on bad ground is absolutely exhausting. Between our advanced dressing stations and the German trenches were several thousands of yards of country sliced and resliced by trenches, and these trenches had been so battered out of shape that they were resolved into a string of deep ditches and holes.

During the advance in the Arras region the corps main dressing stations were from the very first moment an absolutely invaluable part of the whole arrangement; the advance was so rapid, the weather conditions so appalling, the carries so long, and the roads so awful, that attempts to get the wounded to the rear except by stages must have led to hundreds of deaths through mere shaking and jolting. Looking back on that momentous period, the recollection is one of days of storm, wind, rain, and snow, and nights bitterly cold. The nights were pitchy black, illumined now and again by gun and shell flashes, but otherwise so dark that a tent a few yards off was hardly to be recognized; even when a tent flap was pushed aside and a stretcher taken in or out the tent itself was scarcely more visible, for only oil lamps could be used.

In the daytime at the advanced dressing stations the water oozed steadily through the overhead ground, dripping on to everything. There were very few periods of real dryness during the week, though sometimes the sun shone brightly for an hour or two. The men were splendid, but the rain and cold little by little had its effect upon the wounded, who arrived at the dressing stations soaked, and often very collapsed.

The medical staffs in the advanced formations rose magnificently to the occasion. There must have been very many men who worked continuously for two or three days; but they have their reward in knowing that their share in an organization which worked admirably is well recognized, and also in learning that in the opinion of those who have been receiving the cases at the base the men have come down in very good order. Though many of the wounds were severe, the proportion of light cases is large.

THE TORPEDOING OF HOSPITAL SHIPS BY GERMANY.

DECLARATION BY THE BRITISH ADMIRALTY.

THE Secretary of the Admiralty made the following announcement and issued the accompanying historical explanatory statement on April 23rd:

On the evening of April 17th the s.s. *Donegal* and *Lanfranc*, whilst transporting wounded to British ports, were torpedoed without warning.

Owing to the German practice of sinking hospital ships at sight, and to the fact that distinctive marking and lighting of such vessels render them more conspicuous targets for German submarines, it has become no longer possible to distinguish our hospital ships in the customary manner. One of these two ships, therefore, though carrying wounded, was not in any way outwardly distinguished as a hospital ship. The distinctive marking of the other had not yet been removed. Both were provided with an escort for protection.

The *Donegal* carried slightly wounded cases, all British. Of these, 29 men, as well as 12 of the crew, are missing, and presumed drowned.

The *Lanfranc*, in addition to 234 wounded British officers and men, carried 167 wounded German prisoners, a medical personnel of 52, and a crew of 123. Of these the following are missing and presumed drowned:

2 Wounded British officers.
11 Wounded British other ranks
1 R.A.M.C. Staff.
5 Crew.
2 Wounded German officers.
13 Wounded German other ranks.

One hundred and fifty-two wounded German prisoners were rescued by British patrol vessels at the imminent risk of being themselves torpedoed.

The illegal and inhuman submarine warfare which Germany has waged upon merchant shipping has for some time been openly adopted against hospital ships flying the Red Cross flag and otherwise acting in complete conformity with the requirements of the Hague Convention.

This culmination of savagery has brought the world face to face with a situation that is without parallel in civilized warfare. It has no justification in any conceivable distortion of international law, nor in the most brutal creed of necessity.

The British Government, in considering fully the measures to be adopted in these circumstances, has had in review the entire facts on which the German Government claims to have acted. These may be recapitulated in brief for the consideration of the civilized world.

On January 29th, 1917, the German Government addressed a memorial to the American and Spanish Embassies for transmission to the British and French Governments. In this it was stated that the hospital ships of the Allies, and of Britain in particular, were employed for the purpose of transporting troops and military supplies. The evidence of a number of witnesses, the majority of whom were anonymous and the remainder German, was cited in support of this outrageous statement. The German Government, in conclusion, declared that no hospital ship would be "tolerated" in the tract of sea lying between lines connecting Flamborough Head

and Terschelling on the one side and Ushant and Land's End on the other.

The substance of this memorial was embodied in an official German wireless message, and on the evening of January 31st the British Foreign Office issued a statement to the effect that although no communication had been received through the customary channels alleging the misuse of British hospital ships they most emphatically denied that such ships had been used in any way contrary to the Hague Convention. It was pointed out that under this Convention Germany had an obvious remedy in cases of suspicion—the right to visit and to search any hospital ships encountered on the high seas. From the refusal of the German Government to tolerate the hospital ships within certain limits only one conclusion could be drawn—"namely, that it is the intention of the German Government to add yet other and more unspeakable crimes to the long list that disgraces their record."

The Government of the United States was requested to inform the German Government that if the threat were carried out immediate reprisals would follow.

The course dictated by humanity and common sense was plain, and needed no reminder such as was given by the British Government. Yet in spite of their emphatic denials of the German falsehoods and the subsequent warning conveyed, the British hospital ship *Asturias* was torpedoed without warning on the night of March 20th. The ship was steaming with all navigation lights burning and the proper Red Cross sign brilliantly illuminated. The cumulative evidence that she has been torpedoed and not mined was only accepted after it had been confirmed beyond all doubt and after exhaustive investigation. The loss of life on this occasion included a nursing sister and a stewardess, a fact which might have brought home to any enemy but Germany some sense of the enormity of the outrage.

But the nation responsible for the murder of Nurse Cavell appears to have accepted the intelligence with composure, if not with satisfaction. The German official wireless message of the 26th finally established the guilt of the German Government, who, having boasted of the deed, published on the 29th a further message which said: "It would moreover be remarkable that the English in the case of the *Asturias* should have abstained from their customary procedure of using hospital ships for the transport of troops and munitions."

On the night of March 30th–31st the hospital ship *Gloucester Castle* met with a similar fate. On this occasion the Berlin official wireless message again cynically published a notification that she was torpedoed by a U boat, thus removing any possible doubt in the matter.

The British Government thereupon authorized prompt measures of reprisal in accordance with the announcement already referred to, and on April 14th a large squadron of British and French aeroplanes bombarded the German town of Freiburg with satisfactory results.

In spite of the warnings conveyed to Germany that her barbarous attacks on hospital ships would result in such action on the part of Great Britain, the German Government published through the wireless message of April 16th an abusive protest which "categorically contested any justification" for this reprisal. Nothing could afford a better illustration of German mentality and reasoning. On the other hand, the spirit in which the Allies exacted retribution is shown by the purely military character of the measures adopted. The airmen who carried out the attack were exposed to, and did in fact incur, precisely the same dangers from the town defences as they would have been in the course of an ordinary action.

It was plain, however, that any retaliatory measures open to a Government upholding the principles of humanity and justice would not prove a deterrent to Germany in the future. Such reprisals could be only punitive in effect, and it was necessary to reconsider the entire status of hospital ships in the light of the attitude taken by the German Government.

The markings agreed upon at the Hague Convention, which had hitherto guaranteed the immunity of hospital ships from attack, rendered them no longer inviolable. The custom of showing all navigating lights and illuminating the distinctive markings at night only afforded a better target for German submarines. It was therefore decided that sick and wounded, together with medical personnel and supplies, must in future be transported for their own safety in ships carrying no distinctive markings, and proceeding without lights in the same manner as ordinary mercantile traffic.

Notice has accordingly been given to the German Government that the British Government have withdrawn certain vessels from the list of hospital ships published by them in accordance with international law, and they will no longer appear thereon.

During the recent fighting on the Western front a very large number of wounded German prisoners have fallen into our hands. These officers and men have to be transported to England for treatment by the same means that our own wounded are brought over, and practically all ships transporting wounded are bound to carry a proportion of German wounded. These will naturally share with British wounded equal risks from the attacks of German submarines.

Whether the policy of the German Government is likely to be deflected from its abominable course by the knowledge that it can only be pursued at the expense of their own wounded remains to be seen.

In conclusion, it may be recalled that although Germany did not frame any formal allegation of the misuse of hospital ships against the Allies until the commencement of 1917, the British hospital ship *Asturias* was fired at and missed by a German submarine on February 1st, 1915, in broad daylight while flying the Red Cross flag. In the light of recent events it seems reasonable to suppose that the hospital ships *Braemar Castle* and *Britannic* were also torpedoed in November, 1916, although the evidence at the time was not considered conclusive as to whether their losses were occasioned by mines or torpedo.

PROTEST BY THE INTERNATIONAL RED CROSS COMMITTEE.

A Reuter's telegram from Geneva, dated April 22nd, states that the International Red Cross Committee has addressed a note to the German Government referring to the German order issued on January 29th, 1917, regarding the sinking of hospital ships and the torpedoing of the hospital ships *Asturias*, *Britannic*, and *Gloucester Castle*. The protest is in the following terms:

The International Committee, whose right and duty it is to enforce respect for the principles of the Red Cross and the Geneva Convention by reporting violations of them, draws the very serious attention of the German Government to the responsibility which it would assume towards the civilized world by persisting in a resolution which is in contradiction to the humanitarian conventions which it has pledged itself solemnly to respect.

In torpedoing hospital ships it is not attacking combatants, but defenceless beings wounded or mutilated in war and women who are devoting themselves to the work of relief and charity. Every hospital ship is provided with the external signs prescribed by international conventions, the use of which has been regularly notified to belligerents and should be respected by belligerents. The latter may, according to the Hague Convention, exercise the right of search, but have in no case any right to sink a ship and expose to death the hospital staff and the wounded.

The *Asturias* appears to have been torpedoed without any care having been taken to ascertain her character or her destination. Even if the correctness of the facts were admitted upon which Germany bases justification of her order, the International Committee considers that nothing can excuse the torpedoing of a hospital ship, and expresses the hope that such an order, contrary to international conventions, will cease to be carried out.

CASUALTIES IN THE MEDICAL SERVICES.

ARMY.

Killed in Action.

CAPTAIN E. J. BLAIR, R.A.M.C.

Captain Edward James Blair, R.A.M.C., was killed in action on April 11th, while going to the relief of a wounded officer. He was the son of the late John Blair, of Markinch, Fife, and was educated at Edinburgh University, where he graduated M.B. and Ch.B. in 1914. Before the war he held a commission as Captain in the 5th (Territorial) Battalion of the Royal Scots, the Queen's Edinburgh Rifles, but transferred to the R.A.M.C.(T.F.) as lieutenant in the Highland Cyclist Battalion on November 26th, 1914, and was promoted to captain on April 1st, 1915. He had been at the front about two years, was wounded by a shell

eighteen months ago, and was gazetted as a recipient of the Military Cross on January 10th last.

CAPTAIN S. J. LINZELL, M.B., M.C., R.A.M.C.

Captain Stanley James Linzell, M.B., M.C., R.A.M.C., previously reported missing, but now officially reported killed in action on April 2nd, was born on July 20th, 1888, the only son of Mr. H. J. Linzell of Felixstowe. He was educated at Bishop's Stortford and Edinburgh University, where he was president of the Royal Medical Society, and graduated M.B., Ch.B. in 1912. He had also held the posts of house-physician to the Edinburgh Royal Infirmary and medical officer to the Central Branch of the Manchester Royal Infirmary. He entered the R.A.M.C. as lieutenant on January 30th, 1914, and was promoted to captain on March 30th, 1915. He was wounded early in the war and again slightly a few weeks before his death, when he was D.A.D.M.S. to a division. He was gazetted the Military Cross on April 17th, a few days after his death, for the following acts:

For conspicuous gallantry and devotion to duty in superintending the evacuation of the wounded. He continually visited the forward battalion head quarters, passing under very heavy fire. He set a splendid example of courage and determination throughout.

CAPTAIN T. W. MARTIN, R.A.M.C.

Captain Thomas Whittle Martin, R.A.M.C., was killed in action on April 9th. He was the younger son of the late Dr. J. Y. Martin, J.P., of Walkden, Lancashire, and was educated at Rossall and at the Victoria University, Manchester, where he graduated M.B and Ch.B. in 1912, subsequently going into practice at Hale, Cheshire. He entered the Special Reserve of the R.A.M.C. as a lieutenant on October 7th, 1914, joined for service on April 7th, 1915, and was promoted to captain six months later. He went to France in May, 1915, and had received the Military Cross for gallantry in action. When killed he was attached to the Royal Scots, a regiment which has suffered severely in the recent fighting.

CAPTAIN G. R. PLAISTER, R.A.M.C.

Captain Geoffrey Ratcliffe Plaister, R.A.M.C., was killed in action on April 11th. He was educated at the London Hospital, and, after taking the diplomas of M.R.C.S. and L.R.C.P.Lond. in 1905, went into practice at Tottenham, where he was honorary secretary of the North-East London Clinical Society. He was also a member of the British Medical Association. Early in the war he served as a chief inspector of the Special Constabulary. He took a temporary commission in the R.A.M.C. in 1915, and was promoted to captain a year later. He went to France in September, 1915, had served in the battle of Loos and of the Somme, and was attached to the York and Lancaster Regiment when killed.

CAPTAIN V. K. SADLER, R.A.M.C

Captain Vyvyan Kendall Sadler, R.A.M.C., was killed in action on April 17th, aged 38. He was the son of Mr. A. C. Sadler, of Richmond, Surrey, was educated at Rossall and at University College Hospital, London, and, after taking the diplomas of M.R.C.S. and L.R.C.P.Lond. in 1907, filled the post of resident medical officer of Tiverton Infirmary. When the war began he was serving as a surgeon in the P. and O. Company. He then joined the hospital ship *China*. Subsequently he took a commission in the R.A.M.C., and, after serving in the hospital ship *Cambria*, went to the front in January, 1917.

CAPTAIN T. WELSH, S.A.M.C.

Captain Tom Welsh, South African Medical Corps, was killed in action on April 13th. He was the younger son of Mr. Welsh of Edinburgh, and was educated at Merchiston School and at Edinburgh University, which he represented both in athletics and in Rugby football, and where he graduated M.B. and Ch.B. in 1910. After filling the posts of resident house-surgeon in the gynaecological wards and of resident house-physician in the Royal Infirmary, Edinburgh, and of resident house-surgeon at Ramsgate General Hospital, he went out to South Africa as assistant medical officer of the Knight Central Mines at Johannesburg. He took a commission as captain in the South African Medical Corps on November 4th, 1914, and received the Military Cross on January 10th, 1917.

LIEUTENANT E. EVANS, R.A.M.C.

Lieutenant Edward Evans, R.A.M.C., temporary, attached Royal Welsh Fusiliers, who is reported as killed in action, was educated at Trinity College, Dublin, and at Mercer's Hospital, Dublin. He was son of the late Dr. Henry Evans, of Portmadoc, North Wales. He took the University Licence in Medicine and Surgery in 1914, and before he joined the R.A.M.C. in 1916 acted as house-surgeon at the County Hospital, Inniskillen.

SECOND LIEUTENANT H. SNELL, L.D.S.

Second Lieutenant Herbert Snell, L.D.S., of the London Regiment, was killed in action on April 9th, aged 36. He was the second son of Mr. Joseph Snell of Horsell, Surrey, and was educated at Guy's Hospital, taking the L.D.S., R.C.S.Eng., in 1905. He was in practice at Woking, Surrey, till he joined an O.T.C. in January, 1916. He got his commission in January, 1917, and shortly afterwards went to the front, attached to the Lancashire Fusiliers. He was killed while returning from patrol duty. His elder brother, Captain Norris Snell, L.D.S., of the East Yorkshire Regiment, was killed in action in July, 1916. He also was educated at Guy's, took the L.D.S., R.C.S.Eng., in 1896, and was in practice at Ipswich, till he took a commission on November 30th, 1914.

Accidentally Killed.

CAPTAIN J. J. WEAVER, R.A.M.C.

Captain John James Weaver, R.A.M.C., was accidentally killed by a fall from his horse in Ireland on April 20th, aged 57. He was the elder son of the late James Weaver, M.D., of Southport, was educated at University College, London, and took the diplomas of M.R.C.S. and L.S.A. in 1886, also taking the D.P.H.Camb. in 1900. After filling the post of house-surgeon at the Oldham and Southport infirmaries successively, he became medical officer of health of the County Borough of Southport in 1900, where he was also medical superintendent of the infectious diseases hospital, and medical officer of the police force. He took a temporary commission in the R.A.M.C. towards the end of 1915, and was promoted to captain a year later. He leaves a widow and a daughter.

Died on Service.

LIEUT.-COLONEL S. W. HEWETSON, M.D., C.A.M.C.

Lieutenant-Colonel Samuel William Hewetson, C.A.M.C., whose death on March 6th at the Royal Free Hospital, London, after an operation, was announced in our issue of March 24th, was born at Port Elgin, Ontario, in 1873. In August, 1914, he was in practice at Pincher Creek, Alberta, and volunteered for active service, being appointed medical officer of an overseas battalion. Later he was gazetted A.D.M.S. of Military District No. 13, and when the eighth field ambulance of the Canadian Expeditionary Force was authorized Lieutenant-Colonel Hewetson was given the command, and in due course proceeded overseas with the unit. Some time ago it was reported that he was suffering from nervous breakdown and shell shock.

CAPTAIN T. MCCOSH, R.A.M.C.

Captain Thomas McCosh, R.A.M.C., died on service on April 16th, aged 34. He was the third son of the late Thomas McCosh of Rutherglen, Glasgow, and was educated at Glasgow University, where he graduated M.B. and Ch.B. in 1905. After serving as house-physician and house-surgeon in the Glasgow Western Infirmary he went into practice at Woodford Green, Essex. He took a temporary commission in the R.A.M.C. in July, 1915, and was promoted to captain a year later. He was attached to the Welsh Regiment when killed, and had received the Military Cross.

LIEUTENANT L. G. SCUDAMORE, R.A.M.C.

Lieutenant Leonard George Scudamore, R.A.M.C., died after a short illness at a camp in England on April 17th. He was educated at St. Thomas's Hospital, took the diplomas of M.R.C.S. and L.S.A. in 1891, and after serving as clinical assistant in the skin department at St. Thomas's and as clinical assistant at St. Luke's Asylum, went into practice at Abertysswg, New Tredegar, Monmouthshire. He had only recently taken a commission in the R.A.M.C.

L. A. R. FENNELL, L.D.S.

Mr. Linton Albert Ramsey Fennell, L.D.S., died at Romford Hospital on April 14th, aged 37. He took the L.D.S. of the R.C.S.Eng. in 1909, and was in practice at Camborne, Cornwall, where he was platoon commander in the Camborne Volunteer Corps, till he recently joined the Artists' Rifles with a view to a commission in the army.

THE LATE CAPTAIN J. R. GYLLENCREUTZ, R.A.M.C.

The late Captain James Randolph Gyllencreutz, whose death on board the hospital ship *Salta* was recorded in our issue of April 21st, p. 524, volunteered for service in the first days of the war, went to France in October, 1914, and was for some months attached to a base hospital at Boulogne; from there he exchanged to the *Salta* in July, 1915, and had remained with the vessel since that time.

A. A. S. writes:

His had been a roving life, during which he had visited many parts of the world, both East and West. Whilst at home no man possibly had acted as locumtenent in so many hospitals as he. His knowledge of the methods and peculiarities of the different institutions of England was probably unique, and the experience gained in his various sojournings was never wasted. A sound surgeon, an able physician, an excellent anaesthetist, and possessed of an extensive practical knowledge of pathology and bacteriology, he was a man of infinite parts; always ready for the hardest work, and ever calm and collected in an emergency, he was an invaluable member of any unit to which he was attached.

Socially his unfailing good humour and cheery nature, combined with his gift for narrative and comic song, made him friends the world over, and the mere appearance of his well-known figure in the doorway at once dispelled all gloom and sadness and had the power of generating an optimistic and light-hearted atmosphere at the most trying times. Enemies had he none, and many a heart in many a land will have felt the sadder for the appearance of his name in the roll of honour. He was an "all-round" man in the finest sense of the phrase.

Wounded.

Major G. J. Boyce, Canadian A.M.C.
Captain J. G. Brown, R.A.M.C. (temporary).
Captain R. J. Gardiner, Canadian A.M.C.
Captain W. G. Goudie, R.A.M.C. (temporary).
Captain G. R. Johnson, Canadian A.M.C.
Captain J. R. Kemp, M.C., R.A.M.C. (temporary).
Captain J. F. Murphy, M.C., R.A.M.C., S.R.
Captain W. Parker, R.A.M.C. (temporary).
Captain J. S. Prentice, R.A.M.C. (temporary).
Captain R. A. W. Proctor, R.A.M.C. (temporary).
Captain A. Short, New Zealand A.M.C.
Captain T. C. Storey, R.A.M.C., S.R.
Captain A. H. Thomas, R.A.M.C. (temporary).

DEATHS AMONG SONS OF MEDICAL MEN.

Bristowe, Vivian Ernest John, youngest son of the late Dr. John Syer Bristowe, F.R.S., LL.D., died on April 14th, while serving with the R.A.M.C. in East Africa.

Browne, Albert Edward, Lieutenant Canadian Forces, son of the late Dr. Browne, killed April 9th, aged 23.

Caleb, C. D. N., Second Lieutenant Devonshire Regiment, only son of Dr. C. C. Caleb, M.B., Professor of Physiology, Lahore University, killed April 2nd, aged 23. He was educated at Berkhamsted School and at Birmingham University, enlisted in the Public Schools Battalion in September, 1914, and got a commission in October, 1916.

Douglas, Archibald Stirling, Private, Highland Light Infantry, youngest son of the late Dr. Douglas, of Sanchez, San Domingo, West Indies, reported missing on July 1st, 1916, now presumed killed, aged 18.

Patterson, Robert Arthur, Second Lieutenant Rifle Brigade, second son of Dr. Charles S. Patterson, of Eastbury, Berkshire, killed April 12th, aged 21. He was an undergraduate at Jesus College, Cambridge, when he took a commission on December 16th, 1914.

Richard, Lawrence Brown, Lieutenant Canadian Forces, younger son of the late Benjamin Maule Richard, surgeon, Dumbarton, killed April 9th.

Rundle, Beaumont, Lieutenant Australian D.A.C., of Luna, Oman-ama, Queensland, youngest son of the late Dr. G. E. Rundle, of Creewood, Sydney, and of Looe, Rooty Hill, New South Wales, died of wounds on April 15th, aged 31.

Spence, Geoffrey S., Second Lieutenant South Wales Borderers, younger son of the late Dr. J. W. Spence, of Bedford, died of malaria in Queen Alexandra's Military Hospital, Millbank, on April 15th, aged 22. He got his commission in February, 1916.

Taylor, W. B., Second Lieutenant Yorkshire Regiment, son of Captain D. M. Taylor, R.A.M.C., of Shelf, Halifax, died in hospital in France from wounds received in action, aged 20. He was seriously wounded in one leg, which had to be amputated on April 15th. On the following day he seemed to be improving, but death took place on April 17th. He was educated at Archbishop Holgate's Grammar School, York, and afterwards at St. George's College, London, and entered the civil service. He joined the Inns of Court O.T.C. in August, 1915, and obtained a commission in July, 1916. He was wounded in the battle of the Somme, and rejoined his original regiment, the Yorkshires, in January last.

Todd, Valentine O., Captain King's Own Royal Lancaster Regiment, second son of Colonel O. Todd, Army Medical Staff, killed April 10th, aged 33. He joined the army in 1905, and became captain on February 22nd, 1915. He was attached to the Royal Flying Corps.

Trevor, Herbert Edward, Brevet-Major Northampton Regiment, temporary Lieutenant-Colonel Essex Regiment, second son of Surgeon-General Sir Francis Trevor, K.C.S.I., C.B., Army Medical Staff (ret.), of Over Worton, Steeple Aston, killed April 11th, aged 32. He was educated at Eastbourne College and at Rugby, and got a commission in the Northamptons from Sandhurst in 1903, becoming captain on November 30th, 1910. He completed his course at the Staff College in 1914; had been chiefly employed on the staff at the front; and had been mentioned in dispatches, and promoted to brevet-major for distinguished service in the field.

Webb, Arthur Pelham, Second Lieutenant King's Shropshire Light Infantry, second son of Dr. H. Pelham Webb, killed April 9th, aged 32.

MEDICAL STUDENT.

Hemphill, Richard Patrick, Second Lieutenant Leinster Regiment, and Royal Flying Corps, reported killed as the result of an accident. He was the second surviving son of the Rev. Samuel Hemphill, D.D., Dublin, and was a second year medical student at the School of Physic, Trinity College, Dublin. Before he joined the army he had been for several years a member of Campbell College and Dublin University O.T.C. In Trinity College he had many friends who anticipated for him a most successful career. He was an honours man in classics and in natural science. His commission was dated December, 1914, and he was in service abroad since May, 1915; at first he was at Ypres, Armentières, and the Somme, more lately he was at Salonica and was transferred to Egypt on joining the Flying Corps. At the time of his death he was 22 years of age.

HONOURS.

A SUPPLEMENT to the *London Gazette*, issued on April 17th, contains a list of honours and awards conferred by the King in recognition of gallantry and devotion to duty in the field, in which the names of the following medical officers are included:

To be Companion Distinguished Service Order.

Temporary Lieutenant John Maximilian Hammond, M.B., R.A.M.C., attached Devon Regiment.

For conspicuous gallantry and devotion to duty in evacuating a large number of wounded under the most difficult conditions. He was himself subsequently wounded, and, although both his feet were practically blown off, he ordered his stretcher-bearers to carry away another wounded man first.

Bar to the Military Cross.

Temporary Captain Ernest Emrys Isaac, M.C., R.A.M.C., attached Royal Fusiliers.

For conspicuous gallantry and devotion to duty. He worked continuously under very heavy fire and was responsible for the successful evacuation of the wounded. He set a splendid example of courage and determination throughout the operations. (M.C. gazetted October 20th, 1916.)

Temporary Captain Patrick Joseph Lane, M.C., M.B., R.A.M.C.

For conspicuous gallantry and devotion to duty. On several occasions he led out squads of stretcher-bearers under very heavy fire and succeeded in bringing in many wounded men. He set a splendid example of courage and determination throughout. (M.C. gazetted November 25th, 1916.)

Captain Rudolph Albert Peters, M.C., M.B., R.A.M.C., attached King's Royal Rifle Corps.

For conspicuous gallantry and devotion to duty. He continually tended the wounded under very heavy fire. He set a splendid example and showed an absolute disregard for his own personal safety. He has on many previous occasions done fine work. (M.C. gazetted October 20th, 1916.)

Temporary Captain John Caruthers Sale, M.C., R.A.M.C., attached Royal Fusiliers.

For conspicuous gallantry and devotion to duty. He displayed great courage in collecting and dressing the wounded in the face of a very hostile barrage. He set a splendid example to all ranks. (M.C. gazetted November 25th, 1916.)

Military Cross.

Temporary Surgeon Frederick Hugh Lester Cunningham, R.N.

For conspicuous gallantry and devotion to duty. He displayed great courage and determination in searching for the wounded in exposed positions and tending them under very heavy fire. He has previously done fine work.

Temporary Captain Victor Thomas William Eagles, R.A.M.C.

For conspicuous gallantry and devotion to duty. He organized and led search parties for wounded and worked continuously under very heavy fire for over twenty-four hours. He set a splendid example of courage and determination throughout.

Captain Gladston Montague Hunt, A.A.M.C.

For conspicuous gallantry and devotion to duty. He showed an absolute disregard of danger and set a splendid example to his stretcher-bearers, working with them over ground continually swept by heavy fire. He worked for six consecutive weeks in a forward area in charge of an advanced dressing station.

Captain Norman Parsons Jewell, M.B., East African Medical Service.

For conspicuous gallantry and devotion to duty. He worked continuously for sixty-two hours and single-handed, attending to over 100 wounded men. He has on many previous occasions done fine work

Temporary Lieutenant Charles Gordon Kemp, M.B., R.A.M.C., attached Northumbrian Regiment.

For conspicuous gallantry and devotion to duty. He worked unceasingly for two days under very heavy fire and succeeded in evacuating a large number of wounded. He displayed great courage and determination throughout the operations.

Captain Harrie Bertie Lee, A.A.M.C.

For conspicuous gallantry and devotion to duty in evacuating the wounded. He set a splendid example throughout and worked continually under very heavy fire. He has previously done fine work.

Captain Stanley James Linzell, M.B., R.A.M.C.

For conspicuous gallantry and devotion to duty in superintending the evacuation of the wounded. He continually visited the forward battalion head quarters, passing under very heavy fire. He set a splendid example of courage and determination throughout.

Temporary Captain Thomas McCosh, M.B., R.A.M.C., attached Welsh Regiment.

For conspicuous gallantry when his aid post was subjected to heavy shell fire for over three hours. He, with absolute disregard for his own personal safety, set a splendid example of courage and devotion to duty.

Temporary Surgeon William James McCracken, M.B., R.N.

For conspicuous gallantry and devotion to duty. He continually attended to the wounded under very heavy fire. He has previously done fine work.

Temporary Captain Herbert Walker, R.A.M.C.

For conspicuous gallantry and devotion to duty. He led his stretcher-bearers with great courage and determination for a period of thirty-six hours. It was due to his energy and resource that a large number of wounded men were evacuated under the most trying conditions.

In addition to thirteen non-commissioned officers and men of the R.A.M.C. and one sergeant in the A.A.M.C. who have been awarded the Military Medal for bravery in the field, one private in the R.A.M.C. has been granted a bar to the Military Medal and one receives the Distinguished Conduct Medal.

Foreign Decorations.

The King has granted the recipients of the following orders unrestricted permission to wear the decorations conferred upon them by the Allied Powers for distinguished services rendered during the course of the campaign:

Conferred by the King of the Belgians.

Ordre de la Couronne: Temporary Colonel Sir Almroth E. Wright, C.B., M.D., A.M.S., and Captain Stewart Ranken Douglas, late I.M.S. (Officiers). Temporary Lieutenant Eric Shaw, M.B., R.A.M.C. (Chevalier).

Conferred by the King of Serbia.

Order of the White Eagle (4th Class): Lieutenant-Colonel E. T. F. Birrell, C.M.G., M.B., R.A.M.C., and Major M. J. Cromie, R.A.M.C.

Cross of Karageorge (2nd Class Silver Star with swords): Sergeant-Major G. S. Harrington, R.A.M.C.

Order of St. Sava: Temporary Lieutenant R. MacKenzie Morison, M.B., R.A.M.C.

Conferred by the Sultan of Egypt.

Order of the Nile (3rd Class): Major R. G. Anderson, R.A.M.C., late Assistant Adjutant-General Recruiting Department, Egyptian Army, Major William Byam, R.A.M.C., late Medical Corps (Egyptian Army); (4th Class): Captain Edward Gibbon, M.B., R.A.M.C., attached Medical Corps, Egyptian Army.

NOTES

The Secretary of the County of London Branch of the British Red Cross Society announces that in several Red Cross auxiliary hospitals in the county the number of beds has been increased at the instance of the War Office. In one case an annexe to accommodate 108 patients has been opened, at another hospital a second hut has been erected providing for twenty-five more patients, and in a third the accommodation has been increased by 10 beds. In view of the increasing shortage in medical and nursing staff the Army Council has recently notified that no offers will in future be accepted of auxiliary hospitals which do not contain at least 20 beds in hospitals for officers or 40 beds in hospitals for other ranks. The offer of a hospital of 50 beds in Southwark has been refused on the ground that the building, in which there is accommodation for some 200 patients, could be utilized to greater advantage if the military authorities established a hospital in it themselves.

England and Wales.

Laboratory Arrangements in Manchester for the Diagnosis of Venereal Diseases.

In supplement to the note in the JOURNAL of April 14th on the Manchester scheme for the treatment and diagnosis of venereal disease, it may be stated that the arrangements for carrying out the laboratory work under the direction of Professor Delépine at the Public Health Laboratory of the University are intended to cover every requirement not only of Manchester but the surrounding district. To guarantee the laboratory against loss which might occur if the examinations did not reach the large number expected, each authority sending cases may be required to pay a minimum yearly fee of 3s. per 1,000 of its population and to pay all incidental expenses, which will not exceed 2s. 6d. a case during the first year. The work of examining specimens will be so divided up among the staff as to ensure both accuracy and expedition, and the laboratory will not only supply medical officers of health with outfits and directions for the collection of specimens but will make provision for the taking of samples of blood and other material from patients sent by medical men. So early as last October the laboratory issued a pamphlet giving a list of the various methods for diagnosis, and minute directions for the taking of specimens, including the proper method of taking juice from a chancre or other superficial lesion, obtaining discharges from the urethra, instructions for making films of blood, pus, and other exudations, collecting blood from veins for the complement fixation test or for cultivation purposes. The method of performing a Wassermann test is described in detail by Professor H. R. Dean, who will take charge of this part of the work at the laboratory. A subsequent pamphlet gave a list of the materials suitable for examinations, and it is to be noted that quite a number of products are mentioned beyond those specified in the Local Government Board regulations—for example, rubbings from organs or the organs themselves of fatal cases of congenital syphilis, cerebro-spinal fluid, urine, articular exudations, and blood in gonorrhoea. Moreover, the directions for the taking of specimens are so greatly amplified that practitioners who may have had little experience in the taking and preparing of specimens for examination can hardly fail to satisfy the requirements. The method of lumbar puncture for diagnostic purposes is described, and there are notes on the collection of blood for agglutination tests and for microscopical purposes, including the counting of corpuscles, the estimation of haemoglobin, and for determining the kinds of corpuscles and their differential count. A section is included on the precautions against infection of patients, operators, and laboratory workers, and full directions for the transmission of specimens.

It will thus be seen that the Manchester Laboratory, under the able direction of Professor Delépine, provides for all the requirements of practical diagnosis, and at the same time has kept in view the importance of research work. Professor Delépine recognizes the importance of close co-ordination between the medical officers in charge of treatment at clinics and the pathologist. He also suggests that for many patients who, on account of their social position, would not go to the general hospitals, arrangements might be made to go, in company with or at the request of their medical attendant, to the laboratory where specimens of blood, pus, etc., might be taken, and if necessary treatment given without creating at the laboratory any special venereal clinic. Such patients might be expected to pay a suitable fee, while patients sent by the medical officers of health, or with the sanction of the authorities connected with the laboratory, would be examined and treated free. It is estimated that the laboratory will supply the needs of a population of about 4 millions, and that more than 1,000 Wassermann tests and some 2,000 examinations for spirochaetes and gonococci will have to be done yearly. The out-of-pocket expenses for this will be about £600, and guarantees for this amount can be apportioned among the various authorities using the laboratory according to population.

Proposed Public Health Laboratory for North Wales.

For some time past the medical practitioners of North Wales have felt that there was a real need for the estab-

lishment in North Wales of a bacteriological laboratory where pathological material could be examined to facilitate diagnosis and treatment, and, as a result of a deputation of medical men to the Senate of the University College of Bangor, a joint committee was formed representative equally of the senate and the medical profession to consider the question and, if thought desirable, to draft a scheme. The question was soon widened by the inclusion of the question whether the requirements of sanitary and other public authorities might not also be met at the same time by combining a chemical laboratory where foods and drugs and fertilizers and feeding stuffs could be analysed. Hitherto all this kind of work has had to depend on commercial enterprise outside North Wales, and it was felt that if a laboratory were established in connexion with the University College of Bangor, at least five counties would give it their support and help to provide a satisfactory revenue. The joint committee has therefore recommended that a public health laboratory should be established in organic relation with the university. The draft scheme presented suggests that the laboratory or institute should consist of a bacteriological and a chemical section. The bacteriological section would examine and report on all pathological material from diseases affecting men or animals, to prepare vaccines, etc., for treatment, and carry out research work. It would meet the wants of medical officers of health, tuberculosis officers, medical practitioners, veterinary surgeons, and the agricultural department of the university. The chemical section would undertake analyses under the Food and Drugs Act and the Fertilizers and Feeding Stuffs Act, and of miscellaneous materials sent by sanitary authorities, agricultural societies, and other bodies. For the bacteriological section a qualified medical man would have to be appointed as bacteriologist and pathologist, and for the chemical section an associate or Fellow of the Institute of Chemistry, and skilled assistance would be needed in each section. The draft report suggests that the appointment of the experts would be finally determined by the council of the University College subject to the approval of the Local Government Board and the Board of Agriculture, the candidates being first selected by a special committee representative of the sanitary authorities, agricultural bodies, medical officers of health, and medical and veterinary practitioners. The provision of the necessary accommodation in the new science buildings of the university would greatly reduce the cost of the scheme, and the department would be under the control of a joint committee representative of all the interests concerned. The capital charges in providing and equipping the laboratories are estimated to amount to about £4,000 and the annual charges to about £1,200; and though possibly for the first three years or so the income would hardly cover the expenditure, after that, when the value of the provision becomes widely known, it is practically certain that the project will succeed financially. The medical profession in North Wales is to be congratulated on starting the movement, and on its share in the production of an excellent working scheme. We believe that we are right in saying that a large part of the credit belongs to Dr. E. O. Price of Bangor, who formerly represented North Wales on the Council of the British Medical Association.

Ireland.

FOOD CONSUMPTION OF WORKING CLASS FAMILIES.

PROFESSOR THOMPSON presented to the meeting of the Section of Anatomy and Physiology of the Royal Academy of Medicine in Ireland, on March 16th, an essay on the food consumption of working class families in Great Britain and Ireland, founded on the calculation of the food values of working class families collected by the Board of Trade in 1903–4. The figures were divided into two groups—urban and rural, and further subdivided into five groups, according to wages. Under 25s. a week, the food value of the diet, calculated on the recognized standard, was hardly sufficient. The figures for the Midlands of England were in all groups generally the lowest, and the Irish figures tended to be highest. The amount of protein taken tended to rise with increasing wages. The amount of energy taken in the form of bread decreased with increasing wages. At 25s. a week and lower, over half the energy was from bread; at 40s. and above 42 per cent.

DUBLIN HOSPITAL SUNDAY.

The report presented to the forty-third annual meeting of the Dublin Hospital Sunday Fund on April 20th, when Lord Monck was in the chair, stated that collections were made on November 12th, 1916, in 315 places of worship. The total amount contributed was £4,808 15s. 8d., being an increase of £670 12s. 6d. as compared with 1915, and only £24 19s. 11d. less than 1914, which was a record. The expenses for the year were equivalent to 4.8 per cent. on the total sum collected. As there had been a great increase in the cost of paper, printing, and postage, this result was very satisfactory, and showed that the fund is being worked economically. The report was adopted on the motion of the Archdeacon of Kildare, seconded by Lieutenant-Colonel W. T. Johnston, R.A.M.C. Sir John William Moore, in moving a vote of thanks to the ministers of religion, said they, by their zealous and earnest advocacy of the fund, had contributed to its success for so many years. A question had been raised as to how far the clergy were justified in making a special appeal, on the grounds that wounded soldiers were treated in the hospitals, seeing that the Government paid for the soldiers. Inquiries made by the secretary of the Meath Hospital showed that the amount received during the last year from the War Office was £1,659 8s., or an average of £71 12s. 6d. for each bed occupied. But even if beds were not occupied the expenses went on all the same, and the result was that the hospital had received less than it was entitled to in that respect. The wounded soldiers were fed as they deserved to be, and their special dressings were expensive, so that the hospital had to make up £212 over and above what it received from the War Office. It was objected in some quarters that soldiers were taking the places that ought to be available in the hospitals for civilians, but the truth was that the soldiers were not interfering materially with the treatment of civilians.

THE PROPHYLAXIS OF VENEREAL DISEASE.

We have received from the clerk of the Non-subscribing Presbyterian Church of Ireland a copy of the following resolution, passed by the General Purposes Committee at its quarterly meeting in Belfast on April 19th:

> That we protest against members of the medical profession degrading their profession by providing men with information or appliances which may enable them to consort with immoral women without fear of contracting disease; or by teaching people of either sex the method of preventing conception.
>
> We implore medical men to assist the teachers of religion and morals in the campaign against vice and disease.

Scotland.

DR. JAMES B. SIMPSON, of Golspie, has been appointed Deputy-Lieutenant of the county of Sutherland.

THE INHUMAN TREATMENT OF BRITISH PRISONERS IN GERMAN CAMPS.

The following resolution with regard to the treatment of British prisoners of war in internment camps in Prussia was adopted some time ago by the Medical Faculties of the Universities of St. Andrews, Glasgow, Aberdeen, and Edinburgh, and by the Royal College of Surgeons, Edinburgh, and the Royal Faculty of Physicians and Surgeons, Glasgow:

> The Faculties of Medicine of the Scottish Universities, together with the Presidents and Councils of the Royal College of Surgeons of Edinburgh and of the Royal Faculty of Physicians and Surgeons of Glasgow, desire to record their condemnation and detestation of the neglect and inhumanity which characterized the conduct of certain members of the Prussian medical staff to whom the treatment of British prisoners of war was entrusted, especially in the internment camps at Wittenberg and Gardelegen, during outbreaks of typhus fever which had been largely provoked by overcrowding, insufficient food, and entire absence of all sanitary measures.
>
> The facts as stated in the recent reports of a British Government Committee, which are based mainly on the testimony of officers of the Royal Army Medical Corps, themselves prisoners of war, are of such a nature as to bring indelible disgrace upon the medical men concerned,

and upon the German Government which remains ultimately responsible for the treatment meted out to prisoners of war.

As members of a profession which has hitherto, in every quarter of the civilized world, been inaccessible to the shameful influences which make for barbarity in warfare, we are reluctantly forced to the conclusion that a spirit of gross inhumanity has not been absent from the Prussian Medical Service.

Correspondence.

THE USE OF GUM SOLUTIONS FOR INTRAVENOUS INJECTION.

SIR,—In view of the numerous inquiries which I have received as to the preparation and use of gum solutions for intravenous injection, a few remarks may be of assistance.

There are several conditions in which it may be desirable to raise the blood pressure. The simplest case is that in which a large quantity of blood has been lost by a healthy man, as from a wound of the femoral artery. It appears that many such cases could be saved if the blood pressure were kept up for twenty-four hours or so. In the absence of the possibility of transfusion of blood, what is required here is a solution which has the same viscosity as blood, with a content in colloids having an osmotic pressure equal to those of the blood. There is then very little tendency for water to pass to the tissues. The salt concentration must also be equivalent to that of blood—namely, 0.9 per cent. of sodium chloride. A solution of this kind may be made by dissolving 70 grams of best gum acacia and 9 grams of sodium chloride in 1 litre of water, most easily by the aid of a water bath. Distilled water is not essential, unless for bacteriological reasons. If a free flame be used for heating, the gum is apt to be burnt before it is dissolved. The solution must be strained through linen or fine muslin to remove particles of fibre, etc., and it may then be sterilized by boiling. Commercial gum consists chiefly of the calcium salt of an acid pentosane, so that the calcium content of the above solution is somewhat greater than that of Ringer's solution. It is not necessary, however, to remove the calcium for clinical use, since the vaso-constrictor action of calcium is probably of value. It may be precipitated by alkaline sodium phosphate, if desired. There is stated to be in the gum a certain small proportion of the potassium salt, so that it is not necessary to add the usual potassium chloride of Ringer's solution.

In the second place, it appears from the work of Dale, Bainbridge, and others that there are pathological conditions in which the permeability of the blood vessels is increased in such a way that blood plasma itself escapes without the corpuscles. In other cases water and salts alone escape, leaving proteins in addition to the corpuscles. In the former of these cases the blood clearly requires diluting with a solution which has the viscosity of blood plasma, not that of the whole blood. The above gum solution diluted with about twice its volume of Ringer's solution would be correct as regards its viscosity, but the osmotic pressure of its colloids would be too low. Dextrin may replace gum with advantage for this reason. Its viscosity is lower than that of gum, while its osmotic pressure is higher. A 2.5 per cent. solution has a viscosity rather less than that of the plasma, while its osmotic pressure is about 56 mm. of mercury, rather higher than that of the blood colloids. This would be an advantage, leading to withdrawal of water from the tissues. I find in the normal cat that such a dextrin solution is more effective than pure saline, although the rise of pressure is less permanent than that produced by gum. In the clinical cases in question the concentration of dextrin might well be higher than 2.5 per cent. owing to the low viscosity of such a solution (1.1 times that of water).

When water and salts leave the blood vessels without proteins the blood is very concentrated, and requires the addition merely of 0.9 per cent. saline. Hypertonic (2 per cent.) saline may be of advantage to attract water when there is oedema in the tissues, but it does not seem likely that it would have much effect, since equal concentration of salt within and without the blood vessels would be rapidly established. The addition of a colloid of low viscosity and high osmotic pressure might be better, such as detxrin in 3 per cent. or stronger solutions.

If there is reason to believe that a low blood pressure is due to peripheral dilatation, as, experimentally, after section of the spinal cord high up, the effect of gum solutions, although much more permanent than that of pure saline, is not as great as after mere loss of blood. I have been unable to discover a satisfactory reason for this. Langley has recommended the use of barium chloride in such cases, and I find, in the cat, that the injection of 1 mg. per kilogram of body weight is very effective in combination with gum solution. Such a dose has no effect on the reflexes of an anaesthetized animal, and, if injected intravenously, no ill effects were noticed twenty-four hours afterwards, although for two or three hours there seems to be some stiffness in movement.

It does not seem probable that there is any risk of anaphylaxis if a further injection of gum should be required at a later date. But it was desirable to test the possibility. I injected two guinea-pigs subcutaneously with 5 c.cm. of 7 per cent. gum saline, and a cat with 40 c.cm. of the same solution intravenously. Three weeks later intravenous injection of a similar solution produced no signs of anaphylaxis. One guinea-pig—a very small one—died of heart failure when a volume of gum solution equal to rather more than half of its calculated blood volume had been injected.

An interesting physiological question arises as to what becomes of the gum. I collected the urine from a cat during some six hours after injection, but could not detect any pentose reaction. The gum does not, apparently, escape through the kidney, or with great slowness. The blood of the cat, into which gum had been injected three weeks previously, after removal of the greater part of the proteins by acidulation and boiling, gave no pentose reaction. The problem is worth investigation, since it does not seem altogether impossible that pentose may be utilized to some extent. Dextrin would, no doubt, be slowly converted to glucose.

As regards the technique of intravenous injection, the device of Messrs. Creuzet et Grimberg,[1] to be obtained from M. Adnet, of 26, Rue Vauquelin, Paris, 5e, will be found useful, especially in preventing the vein from slipping away from the needle during its insertion.

I may add that I shall be pleased to send a copy of my paper in the *Proceedings* of the Royal Society to anyone who wishes to examine the physiological justification for the use of gum solutions.—I am, etc.,

University College, London, April 21st. W. M. BAYLISS.

THE TREATMENT OF FRACTURES BY SPLINTS.

SIR,—In the BRITISH MEDICAL JOURNAL of April 14th, p. 475, Mr. Morton writes:

> I do not believe that in every fracture a really perfect anatomical position of the fragments is essential to good function. Indeed, I am sure it is not.

Now I venture to regard this as bad doctrine, which will lead readers to be satisfied with results which fall short of the best. It must be the experience of all hospital surgeons to see many old fractures in which function is impaired because the psychological moment for the reduction of displacement has been lost—that is, the first few days after the accident—as the surgeon treating the case had trusted to some such fallacy as Mr. Morton's statement. It was to be hoped that the conclusions of the committee appointed by the British Medical Association in 1912 had put an end to such beliefs, for in the clearest way statistical evidence led to Conclusion 7:

> Although the functional result may be good with an indifferent anatomical result, the most certain way to obtain a good functional result is to secure a good anatomical result.

Again, in speaking of fixing bones with screws and plates, Mr. Morton writes, "all the screws get loose before long." Now, this is a fallacy which takes a lot of killing, for if the wound remains aseptic there will be no rarefying osteitis, and if there is no rarefying osteitis the screws will not get loose. Rarefaction will be shown as an area of less opacity round the screws in an *x*-ray plate, and I have yet to see screws getting loose in which rarefaction does not exist. I regard it solely as due to infection, which may not be sufficient to inhibit the normal healing of the wound, but which in most cases leads later to formation of

[1] *C. R. Soc. de Biol.*, 80, p. 207.

sinuses, and subsequently necessitates removal of the plate and screws.

After plating operations for compound fractures, or for fractures in the vicinity of the epiphysial lines in children, it is usually necessary to remove the plates and screws. It has been my uniform custom when doing this to demonstrate the fact that in every clean case—and often in others which are septic—the screws can only be removed with a screwdriver, which, if Mr. Morton's statement were true, would neither be necessary nor possible.

Only this morning one of my colleagues at Hampstead Military Hospital was removing a plate which had been left exposed for twelve weeks over a gunshot fracture of the tibia. A heavy sixteen-hole plate was used, with four screws at each end, as far from the septic fracture as possible. To-day seven of the eight screws required a screwdriver for their removal.—I am, etc.,

London, W. 1, April 17th. C. H. FAGGE.

MEDICAL EXAMINATION OF RECRUITS.

SIR,—Your correspondents who have dealt with the injustice of the lay press to Army Medical Recruiting Boards have given various reasons why the work of these boards is occasionally imperfect, though as good as possible on the whole. There is another which I should like to state shortly, and it is due to the impatience of the military authorities themselves. The usual medical board consists of four men, including the president, who is generally an R.A.M.C. man. These men are supposed to work for three hours, and are paid on the basis of three hours' work. At first the board of which I am a member had reasonable time to do its work carefully and well, but soon the military complained that recruits were not being put through fast enough, and we were "speeded up," until on three consecutive days recently we saw 90, 85, and 120 recruits in a morning of three hours. Two of the men on the board have to see each recruit—namely, the president, and the man who tests visions, is responsible for correct weights and measurements, examines teeth, physique, ascertains medical history and absence of hernia or other external disability, examines feet and legs, and puts recruit through physical exercises; the other two men each see half the number of recruits presented, and examine hearts, lungs, abdomen, etc. How can a man adequately examine 90 recruits in three or even four hours? Such hurried and breathless work asks for mistakes and oversights, and they no doubt happen; but I contend that it is not the fault of the overworked medical boards but of those who overwork them. Personally, after seeing 90 men without a pause in a limited time, I feel as if I have been well beaten, and not at all in a condition to begin the heavy work of general practice which has to be crowded into the rest of the day.—I am, etc.,

April 22nd. ANOTHER EXAMINER OF RECRUITS.

SHOCK FOLLOWING INTRAVENOUS INJECTIONS OF CHEMIOTHERAPEUTIC PRODUCTS.

SIR,—In view of the interest attaching to the important subject of shock, and owing to the varied causes which may bring it about, I venture to hope that these few notes *re* the etiology and prevention of the form which may follow the intravenous administration of chemiotherapeutic products will prove of some assistance. I will first tabulate four experiments I performed on rabbits: (1) If 1 c.cm. of colloidal aluminium hydroxide is injected intravenously instantaneous death occurs; (2) if calcium chloride is injected intravenously in one ear before aluminium hydroxide is injected intravenously in the other ear the animal does not die; (3) if calcium chloride is injected intramuscularly the night before the colloidal aluminium is injected intravenously the animal does not die; (4) if glycine or gelatine is added to the colloidal suspension before it is injected, several cubic centimetres may be injected intravenously without mishap.

I will now tabulate four changes, which are most noticeable in the blood withdrawn from animals suffering from shock: (1) The blood is more fluid; (2) the clotting time is delayed; (3) complement disappears; (4) many of the colloidal protein particles go into solution.

From the above I think it may be concluded that shock is due to an alteration in the colloidal state of the protein particles in the serum. The protein particles are emulsion colloids—that is, they contain water and have salts attached to them, and they form the "solid" part or internal phase of the serum. The "liquid" or external phase of the serum is water containing salts and some protein in solution. The particles of the internal phase are kept in their emulsoid state by the normal hydrogen ion concentration. If this normal hydrogen ion concentration is upset the colloidal particles of the internal phase alter their colloidal state, and some go into solution, hence the reason why the blood is more fluid in cases of shock. There can be little doubt that complement is the same as this normal hydrogen ion concentration. The alteration of the colloidal state of the internal phase results in the colloidal particles being deprived of some of their salts; doubtless the calcium salts are some of those which go into solution in the external phase, hence the reason why the clotting time of the blood is delayed in cases of shock.

Any suspension colloid will produce shock if it is injected intravenously, and the shock may be prevented if it is given an emulsoid "coating." Ions readily precipitate a suspension colloid, but not an emulsion colloid, hence when colloidal aluminium hydroxide is injected intravenously, owing to its being sensitive to even univalent ions, it immediately upsets the normal hydrogen ion concentration (complement vanishes), and destroys the emulsoid character of the protein colloidal particles. As I believe the protein particles of the internal phase are mainly concerned in the processes of oxidation and reduction, naturally any change in their colloidal state will rob the body of the oxygen necessary for existence, with the result that the animal dies.

The reason why calcium chloride prevents shock is doubtless its action in increasing the stability of the permeability of the protein particles in the internal phase; in other words, it prevents the protein particles giving up their salts, and thus saves them from going into solution. Shock, even resulting in sudden death, may follow the intravenous administration of the arsenical products now in use. It is highly probable that in such cases some of the arsenic acts as an ion, and produces changes similar to those described above as occurring with aluminium hydroxide. The shock following intravenous injections of the chemiotherapeutic products in man may be of two kinds: (1) cardiac; (2) pulmonary. In my experience the cardiac type is more frequently met with than the pulmonary, and it is the type which may end in death. I have not seen a pulmonary case end fatally.

In the pulmonary type the lips and tongue swell, severe coughing follows, then the patient struggles for breath and becomes asphyxiated. In the cardiac type the patient faints, and he thinks he is going to die; the pulse becomes weaker and weaker till it cannot be felt, the skin becomes blanched and sweats profusely. Often the patient passes his urine and faeces. The faeces are always very fluid owing to the fall of blood pressure, with consequent hyperaemia of the intestines. If the patient recovers he vomits and complains of excruciating pains in his feet and legs. In the mild cases pituitrin, ether, camphor, and adrenalin hasten recovery, but in the severe cases these drugs appear to be valueless. If pituitrin or adrenalin are injected before the arsenic compound, then shock may be avoided, but as severe shock is rare, such a procedure does not seem necessary. In severe cases and indeed in all cases of shock, the wisest plan is to inject intravenously as soon as is possible 10 c.cm. of a 2.5 per cent. solution of calcium chloride. I never give an intravenous injection of an arsenical compound unless I have ampoules of a sterilized solution of calcium chloride handy.

For the protection of suspension colloids I have found that the addition of 3 per cent. of gelatine and 5 per cent. of glucose is the most suitable. As to whether better results in the treatment of shock could be obtained by adding gelatine and glucose to the calcium chloride than by using the latter alone, only experience could prove. Theoretically, such an addition would hinder the further action of the arsenic, but it might at the same time act in the same way on the calcium chloride.—I am, etc.,

London, W., March 25th. J. E. R. MCDONAGH.

BLASTOMYCOSIS.

SIR,—Your leading article (p. 460) opens by stating that "much confusion obtains in the literature and nomenclature here." The article ought not to pass without

comment, the more so as it is founded on a monograph of the Rockefeller Institute for Medical Research, an institute which deservedly commands respect throughout the world.

1. The authors deal first with coccidioides. For a long time it has been clear that the organism with this hideous name beggars the descriptive powers of medical writers. Now America is rich in mycologists of incomparable merit, and the Rockefeller Institute would confer another boon on medicine if it sought the help of one of these to tear the veil from the obvious.

2. We are told that blastomycosis "connotes infections with true yeasts, with torulas, and with oidiums." But an oidium has nothing whatever to do with blastomycosis, and it is clear that the authors have fallen into the same mistake as Ricketts and Castellani. That their oidiums have been known as monilias for twenty-five years I have tried to explain in terms which cannot be misunderstood (*Lancet*, 1913, vol. ii, p. 44). Even in the students' *aide-mémoire* series, the French describe true oidiomycosis, which is an entirely different infection to the American oidiomycosis. Surely it is not carping criticism to insist on this.

3. The authors think that the term blastomycosis "obscures the real differences," etc. The source of obscurity depends on these facts. Practically every saccharomyces may be fixed in its torula stage. This is sometimes taken advantage of in commerce to simplify biological analysis of a pitching yeast. As saccharomyces is rarely pathogenic, this probably concerns us little. But I have proved (BRITISH MEDICAL JOURNAL, 1913, November 29th, p. 1460) that at least one pathogenic monilia occurs also in the torula form, retaining its pathogenicity. There is no reason why this should not occur in other monilias. (Intermediates are really less embarrassing because more amenable to cultural development.) Thus a torula is a mere fungal residue, an unknown quantity. It follows that a diagnosis of torula infection is a confession of failure. It is sometimes all that can be done, but more often it is all that is attempted.—I am, etc.,

Ealing, W., April 8th ROBERT CRAIK.

Obituary.

PROFESSOR COUNT KARL MÖRNER,

RECTOR OF THE ROYAL KAROLINSKA INSTITUTE, STOCKHOLM.

ON March 30th Count Karl Axel Hampus Mörner, Professor and Rector of the Royal Karolinska Medico-Chirurgical Institute, passed away, after a short illness, at the age of 62. He matriculated in 1872, and, after studying in Upsala and Stockholm, he qualified as a practitioner of medicine in 1884. Two years later his thesis on the pigments of melanotic tumours gained him the doctorate of medicine, and at the same time he was appointed professor of chemistry and pharmacy at the Karolinska Institute. His association with that institute synchronized with its advance in scientific productiveness, to which he contributed both directly and by his stimulating influence on his subordinates. In 1892 he was appointed rector of the Karolinska Institute in succession to Keys, and it was rather as the central figure of the institute than as a scientist that he was best known to the Swedish public. As Rector of the Karolinska he participated in drawing up regulations for the Nobel Prize Committees, and he was President of the Nobel Medical Committee. His addresses on the prize-winners, their work and achievements, were a conspicuous feature of the Nobel presentation ceremonies, and were highly appreciated by the Swedish lay public as well as by the members of his own profession. His straightforwardness and modesty endeared him to his associates, who found in him an enemy of all humbug and time serving.

Sir Ronald Ross writes: "Count Mörner spoke English very well, frequently visited this country, and was conversant with most of the work done here in medical and pathological subjects. In 1912 he attended in London the celebration of the 250th anniversary of the founding of the Royal Society. During my two visits to Stockholm I was able to appreciate the high honour in which he was held there. He took the most careful interest in the work of the Nobel Medical Committee, and therefore necessarily in all work done in medical and pathological subjects. As regards personal type he was a gentle and somewhat silent man, but otherwise very genial and affectionate. He suffered severely some time ago from the accidental death of one of his sons. He leaves a widow, Grevvina Mörner, and sons and daughters."

HUGH R. JONES, M.A., M.D., D.P.H.CANTAB.,

LIVERPOOL.

WITH much regret we have to record the death, at the age of 53, of Dr. Hugh R. Jones, which occurred on April 14th from acute pneumonia after a few days' illness. He was actively engaged in his professional work; he was a member of No. 2 Recruiting Medical Board, and his loss at this time will be specially felt. Dr. Hugh R. Jones was born in Liverpool, and received his general education at the Liverpool Institute. He was a brilliant pupil, and gained a scholarship, which took him to Cambridge. In due course he graduated B.A. in the Natural Science Tripos (honours in physiology and chemistry). Two years later he graduated B.Sc. in the University of London. He entered the medical school of St. Bartholomew's Hospital, where his career was punctuated by many distinctions. In 1887 he graduated M.B., B.C.Camb., and in 1890 M.D. In 1892 he took the D.P.H., and returned to Liverpool, and for some time, with Mr. Herbert E. Davies, the analytical chemist, set himself with characteristic vigour the task of coaching medical men for the Diploma in Public Health. Not a few of his professional brethren who now hold the D.P.H. in Liverpool and its environments can bear witness to his ability as a teacher. In his own house he, with Mr. H. E. Davies, had a thoroughly equipped laboratory for the practical subjects in hygiene. Dr. Hugh R. Jones's mathematical trend of mind gained for him the Howard Medal Prize of the Royal Statistical Society. This honour was conferred upon him in 1894 for a remarkable and lucid investigation of the perils and protection of infant life, based from the statistical point of view on the annual and decennial reports of the Registrar-General. The medical information embraces the diseases occurring in childhood, and the main conclusion, now thirteen years old, still, alas! holds good. As an educationist, he insisted that the remedy was education. The bronze medal now adorns the walls of the Liverpool Medical Institution, of which Dr. Hugh R. Jones was a member since 1890. To the *Liverpool Medico-Chirurgical Journal* he contributed papers on excessive infant mortality and on the feeding of infants.

Dr. Hugh R. Jones was in general practice, and at the time of his death held the post of pathologist to the Liverpool Hospital for Cancer and Skin Diseases. At one time it was thought he would have attained by his undoubted merit to a high position, for whatever he undertook he brought all his forceful energy to accomplish, and was an indefatigable worker in any subject in which his interests were enlisted.

The funeral took place on April 19th at Allerton Cemetery, where many of his friends and sorrowing relatives were present to pay their last respects to one whose life was so prematurely shortened. He leaves a widow and one child to mourn his loss, and to cherish the memory of one whose life-stream might not inappropriately be termed torrential in its vigour.

DR. CHARLES MOON, who died at his residence in Dundee on April 13th, was born in 1843 and received his early education at the Tay Square Seminary, at that time one of the chief educational institutions in Dundee. He afterwards went to the High School and at the same time attended the surgery of Dr. Munro. He subsequently studied at the University of Edinburgh and at the school of the Royal College of Surgeons of Edinburgh, and graduated M.B., C.M. in 1866, and M.D. in 1885. After graduating he started practice in Dundee and was appointed to take charge of one of the districts during the outbreak of cholera. He acquired an extensive practice and won the esteem of all the citizens with whom he came in contact. He was a member of the Dundee Branch of the British Medical Association. He is survived by a widow and five sons, two of whom are serving in the army. The funeral, the attendance at which included a large number of medical men, took place at the Eastern Necropolis, Dundee, on April 16th.

The Services.

INDIAN MEDICAL SERVICE.

New Regulations as to Pay.

THE pay of officers of the Indian Medical Service in military employ, in common with that of officers of the Indian Army, consists of two parts: (1) "Grade pay," (2) "staff pay," and when an officer holds an appointment carrying specific staff pay, he draws the two together. For officers up to seven years' service there is a rate, higher than grade pay, somewhat inappropriately termed "unemployed pay," which is the minimum rate to be drawn by an officer who does not hold an appointment carrying specific staff pay.

These rates are as follows:

	Unemployed Pay.	Grade Pay.
Lieutenant	Rs. 420	... Rs. 350
Captain	475	... 400
Captain after 5 years and under 7 years	475	... 450

The minimum rate of staff pay to be drawn with grade pay is Rs. 100, and in peace conditions an officer must pass the lower standard in Hindustani before he can draw any staff pay.

In normal times a young officer of the Indian Medical Service began his service in India on so-called unemployed pay (Rs. 420 *per mensem*)—that is, the minimum rate when an officer holds no appointment carrying specific staff pay. His first advance is usually obtained by appointment to officiate in medical charge of a regiment, and he then receives, provided he has passed the lower standard, grade pay Rs. 350 *plus* staff pay Rs. 100 = Rs. 450. On attaining the permanent medical charge of a regiment, provided he has passed the lower standard, he receives, while a lieutenant, consolidated pay at Rs. 500 *per mensem*.

Hardships arose, when officers were ordered on field service, from restriction to "unemployed pay" through loss of opportunity of passing the language test, and of obtaining or retaining an officiating appointment; and in order to remove this hardship the Secretary of State decided that

(*a*) an officer of less than two years' service who, when ordered on field service, was in receipt of minimum staff pay of Rs. 100 *per mensem*, or who, after proceeding on field service, obtained an appointment carrying minimum staff pay, should continue to receive it, even if afterwards transferred to employment on field service carrying no specific staff pay;

(*b*) an officer of two years' service or over should receive, on field service, minimum staff pay, if no higher rate of staff pay were admissible to him.

The period of two years in (*b*) was adopted as being that within which an officer who passed the language test might reasonably expect to obtain Rs. 100 staff pay, and it was recognized that the language test could not be insisted on during war.

In the light of subsequent experience these arrangements have been amplified, and, with retrospective effect from the beginning of the war, officers in class (*a*) if once in receipt of minimum staff pay continue to receive it if, when returning to India, they are placed on duty carrying ordinarily no specific staff pay, and officers in class (*b*) of less than seven years' service receive minimum staff pay whether on field service or not.

With a view to providing for officers of seven years' service and over who may not hold an appointment carrying specific staff pay it has now been further decided (also with effect from the beginning of the war) that any such officer on military duty is to receive as a minimum the substantive pay of an officer of his seniority in permanent medical charge of a regiment. An officer recalled from civil employ who before his transfer to a civil department had held permanent medical charge of a regiment receives, of course, on recall, the pay of such permanent charge, even if he has not completed seven years' service. The consolidated monthly pay of a lieutenant or captain in permanent medical charge of a regiment is as follows:

	Per Mensem.
Lieutenant	Rs. 500
Captain	550
Captain after 5 and under 7 years' service...	600
Captain after 7 and under 10 years' service.	650
Captain after 10 years' service	700

In addition to the above rates of pay, horse allowance may be drawn in certain circumstances which are detailed in Army Regulations, India.

SLOW PROMOTION.

I.M.S. writes: The officers of the Indian Army have been given accelerated promotion all round owing to war conditions. The officers of the R.A.M.C. have long since had accelerated promotion owing to the automatic increase in their cadre due to war conditions. The officers of the I.M.S. have been left severely alone. Up to the present over 150 temporary commissions have been given in the I.M.S., and its cadre increased accordingly. No promotion, however, has been made on that account. Officers of the I.M.S. find themselves serving under officers of the R.A.M.C. junior to them in service but senior in date of army rank due to this accelerated promotion. The officers of the I.M.S. deeply resent the treatment meted out to them at present.

Universities and Colleges.

SOCIETY OF APOTHECARIES OF LONDON.

THE following candidates have been approved in the subjects indicated:

SURGERY.—*†E. W. Diggett, *D. E. Hearn, *†T. F. Reason, *F. A. Unwin, *†L. J. Vincent.
MEDICINE.—*†G. W. Coombes, †F. A. Unwin, *†C. G. G. Winter.
FORENSIC MEDICINE.—G. W. Coombes, W. H. A. Pratt.
MIDWIFERY.—C. A. W. Chapman.

* Section I. † Section II.

The diploma of the society has been granted to C. G. G. Winter.

Medical News.

DR. PIERRE MARIE has been appointed to the chair of clinical neurology in the University of Paris in succession to the late Professor Dejerine.

THE University of the Cape of Good Hope has conferred the degree of Doctor of Medicine upon Dr. H. Fielden Briggs, an elected member of the Transvaal Medical Council.

THE Oliver-Sharpey Lectures will be given before the Royal College of Physicians of London by Dr. Charles Bolton on Tuesday and Thursday next, May 1st and May 3rd, at the College at 5 p.m. on each day. The subject is "Observations on the pathology of cardiac dropsy."

IN response to an appeal on behalf of the research fund of the pathological institute of the Middlesex Hospital, a donation of £1,000 has been received by the treasurer from Sir John and Lady Bland-Sutton, and a gift of £250 from Mr. G. Vaughan Morgan.

DR. FRANK R. LOGAN has given to the University of Chicago a fund providing an income of £600 a year for the endowment of three research fellowships—one in pathology and bacteriology, one in medicine, and one in surgery.

AT the eleventh annual meeting of the British Science Guild, which is to be held at the Mansion House, London, on Monday next at 4 p.m., with the Lord Mayor in the chair, Lord Sydenham will give an address on national reconstruction. Among the speakers will be the Minister of Education and Mr. H. G. Wells.

MR. DELISSA JOSEPH, F.R.I.B.A., the architect concerned in the rebuilding of No. 299, Oxford Street, formerly the premises of the General Medical Council, came across the original foundation stone during the demolition of the old building, and presented it to the Council. It has now been placed in its new premises. The stone bears the following inscription: "This stone was laid by His Royal Highness Prince Albert for the laboratories of the Royal College of Chemistry in presence of the council and members, June 16th, 1846."

THE annual meeting of the Professional Classes War Relief Council (Incorporated) was held on April 18th, at the Mansion House, under the chairmanship of the Lord Mayor, President of the Council. Among others supporting him were Major Leonard Darwin, Chairman of the Council, Dr. Samuel West, President of the Royal Medical Benevolent Fund, and many other members of the council and of committees representing professional associations. The report for 1916 showed that 177 babies were born in the maternity home during the year; a sum of £7,000 was spent on the education of children; and the total amount expended in the relief of members of the professional classes was more than £30,000.

THE first number of a new periodical devoted—as its title, *La Chirurgia degli Organi di Movimento*, imports—to the surgery of the organs of movement, has recently appeared in Italy. It is published by Licinio Capelli of Bologna (Via Farini, 6) under the editorship of Professor V. Putti. The first number contains among other papers one by the editor on the surgical mobilization of ankylosis of the knee and another by A. Serra on the histology of bone transplantation.

THE council of the British Hospitals Association, 14, Victoria Street, London, S.W., has published its report for the year 1916. The objects of the association are the consideration and discussion of matters connected with hospital management and administration. The continuance of the war has again seriously affected the work of the association, and has necessitated the suspension of the annual conference, but the general work has been carried on. Various problems in connexion with the position of voluntary hospitals have been considered by the council. Viscount Sandhurst, treasurer of St. Bartholomew's Hospital, has accepted the office of president of the association, of which the honorary secretaries are Mr. J. Courtney Buchanan and Mr. Conrad W. Thies.

THERE is a shortage of facilities for the collection, cartage, and destruction of domestic refuse, and the proposal that refuse should be totally consumed by fire on the premises on which it is produced has much to commend it from the hygienic point of view. The April issue of "A Thousand and One Uses for Gas," published by the British Commercial Gas Association of 47, Victoria Street, Westminster, S.W. 1, describes how this may be simply and economically accomplished with the aid of specially designed gas apparatus, or the coke furnaces commonly used for water heating, and it is suggested that local authorities would find it profitable to offer some rebate to householders thus destroying their domestic refuse.

THE annual report for 1916 of the Kashmir Medical Mission, by Dr. Ernest F. Neve, gives a brief record of a busy year's work accomplished in spite of shortage of staff and other difficulties due to the war. A large number of operations, both major and minor, were performed, and the clinical laboratory and *x*-ray apparatus were kept busy. Dr. Neve writes significantly: "Tuberculosis appears to be still rapidly increasing in Kashmir, and the mortality is appalling." The Kashmir Estate Leper Asylum, in connexion with the mission hospital, contained on an average more than a hundred in-patients daily through the year. Nastin was used systematically in one early case with distinct benefit. Several patients were treated with chaulmoogra oil, but with no apparent success.

THE Health of Munition Workers Committee has prepared a form of medical certificate for use in respect of munition workers. It becomes immediately applicable to national factories, and copies will be supplied to medical practitioners in the neighbourhood. It is hoped that controlled establishments will take the same course. The certificate will furnish the information required to avoid difficulties which at present arise in dealing with absences of munition workers on account of illness. It will also, it is considered, have the incidental advantage of providing a basis for the collection of valuable data as to the incidence of different types of illness and as to periods of absence involved. In the covering letter there is no statement to the effect that national factories and controlled establishments are prepared to pay a fee for the certificate, but we may presume that this point has not been overlooked.

A MEMORANDUM has been issued by the Child Study Society, London, on the educational principles upon which all future school reform should be based. In his introduction Professor John Adams, vice-president of the society, argues that the present time is exceptionally favourable to the course of educational reform, owing to the awakening of general interest in education in spite of the war. In the division of labour between the various committees investigating the subject, the Child Study Society has limited itself largely to the more scientific and psychological aspects. The memorandum consists of five sections, the contributors to which agree with the council that it would be best for the results of joint deliberation to be published impersonally. The pamphlet concludes with a series of practical recommendations arising out of the memorandum. It can be obtained from the offices of the Society, 90, Buckingham Palace Road, S.W.1. price 4d., including postage.

Letters, Notes, and Answers.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C., on receipt of proof.

THE telegraphic addresses of the BRITISH MEDICAL ASSOCIATION and JOURNAL are: (1) EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology, Westrand, London;* telephone, 2631, Gerrard. (2) FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate, Westrand, London;* telephone, 2630, Gerrard. (3) MEDICAL SECRETARY, *Medisecra, Westrand, London;* telephone, 2634, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin.

LETTERS, NOTES, ETC.

GLYCERINE IN DISPENSING.

NOW that the Government has refused permission for the supply of glycerine to pharmacists for dispensing purposes, the presence of glycerine, and preparations containing glycerine, as ingredients in medical prescriptions, is a source of embarrassment to dispensing chemists. Glycerine now being no longer available, the proper course for the chemist to take, when a prescription containing it is brought to him, would be to communicate with the prescriber, and ask whether it is his wish that the glycerine should be omitted, or replaced with a "glycerine substitute." At any time this procedure would involve delay and inconvenience, but now that so many practitioners are carrying on work at home under increasing stress, the dispenser's duty is far from clear. We should be glad to hear the views of our readers upon the matter, which presents certain real difficulties.

THE TREATMENT OF CANCER BY CUPRASE.

DR. CASSIO DE REZENDE (Guaratinguetá, Brazil) writes: Having read the article on cuprase by Dr. Cooper (BRITISH MEDICAL JOURNAL, January 13th, 1917, p. 48) and the correspondence following it, it seemed to me to be useful to record my own experience with that remedy. My case, similar to that mentioned by Dr. A. Christie Reid in the BRITISH MEDICAL JOURNAL, January 20th, was one of multiple melanotic sarcomata in a man aged 46 years. The development of the tumours assumed a very acute form, and, since I had nothing to oppose to such a condition, I suggested the use of cuprase. As I knew from a friend that the injections were extremely painful, I took the precaution of first injecting at the site a little stovaine, leaving the needle in place, and through it injecting cuprase. In this way I prevented pains, but I could not prevent my patient from dying in a very short time.

A MEDICAL PRACTITIONER'S CONVICTION QUASHED.

IN the Court of Criminal Appeal, before the Lord Chief Justice and Justices Ridley and Avory, an appeal was made by Dr. William Birch Caley against his conviction and sentence of eighteen months' imprisonment in the second division in February last at the Central Criminal Court on the charge of conspiracy. Appellant was a member of the White City Medical Board, and it was alleged at his trial that he was a party to a conspiracy whereby recruits who were willing to pay were placed in a lower classification than they should have been under the Military Service Acts, or were rejected as unfit for military service; and, further, that he participated in bribes paid by recruits to obtain priority in medical examination in contravention of the Prevention of Corruption Act, 1906. In support of Dr. Caley's appeal it was argued that there was no evidence against him to give to the jury, and that even if there was evidence the learned judge failed in his summing up to give proper direction to the jury. The Lord Chief Justice, in giving judgement, said it was difficult to find evidence which it was said proved sufficiently that Dr. Caley was a party to the conspiracy There was no evidence that he received a penny of the money which Mitchell had accepted, and in which the other persons charged had shared, or that he did anything which would show that he knew the medical reports he gave were false. In two of the five cases which formed the subject of the charge against Dr. Caley he did not classify the men at all, and two others were detectives, one of whom, as a matter of fact, Dr. Caley classified "A," as fit for active service. The court was satisfied that the evidence against Dr. Caley was not sufficient, and the conviction was therefore quashed.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

	£	s.	d.
Seven lines and under	0	5	0
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A whole column	3	10	0
A page	10	0	0

An average line contains six words.

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NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.